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(NASA-TM-88618) AGRICULTURAL SPECTRAL  
SIGNATURES: YUMA TEST SITE, MISSION 91-10,  
19-22 FEBRUARY 1974 (NASA) 136 P

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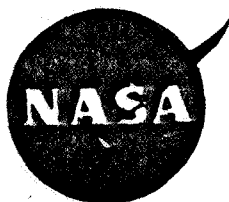
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AGRICULTURAL SPECTRAL SIGNATURES

YUMA TEST SITE

MISSION 91-10

FEBRUARY 19-22, 1974

Dr. R.H. GRIFFIN, II

REPORT NO. 105

21 MARCH, 1974

LYNDON B. JOHNSON SPACE CENTER

## INTRODUCTION

Basic to agricultural remote sensing applications is the study of crop signatures in the field at various growth stages and under various growing conditions.

A crop signature study is being conducted by the Earth Resources Laboratory at the University of Arizona Agricultural Experiment Station, Yuma, Arizona.

The purpose of the study is to determine areas of the spectrum and crop growth stages that would allow for the greatest probability of identification of each specific crop.

A layout of the Experiment Station is presented in Figure 1. The present study is being conducted in fields C-4 through C-14, identified in the figure as the "Signature Study" and the "Alkaloid Field Study".

The detailed plot plan for the spectral signature study is given in Figure 2. The numbers in the lower portion of each plot will be used throughout the study to reference the individual plots. Plots 7-11, 18-22, 24-33, and 40-44 will be planted in mid-February, 1974.

Figure 3 presents details of the alkaloid yield study area. Data points are indicated by the numbers 51-55 which will be used throughout the study to reference the individual plots. Due to the layout of the study, data cannot be obtained from treatment number 2.

Spectral data was taken with an Exotech model E20D filterwheel spectrometer mounted on a truck-boom 20 feet above the ground (Fig. 4 & 5). Three detectors were available; 1) Silicon (Si) with a wavelength range of 490-1290 nanometers was used at every field data point; 2) Lead Sulfide

(PbS) with a wavelength range of 900-3100 nanometers will be used at selected field data points; 3) Mercury-Cadmium-Telluride (HgCdTe) with a wavelength range of 4100-14400 nanometers will be used during the latter part of the study on selected field data points after calibration of the detector is completed.

A Hasselblad model 500 EI with 80mm lens was mounted on the truck boom (Fig. 5) parallel to the spectrometer in order to photograph the spectrometer target. The spectrometer footprint was drawn on each photograph and vegetation ground cover percentage determined.

Incoming radiation was measured with an Eppley Pyranometer and recorded for each day that spectrometer data was taken (Fig. 6). Air temperature and relative humidity were recorded at two and five feet above the ground. Table 1 contains data taken at 1 hour intervals from 7 am to 6 pm on the days when spectrometer measurements were made.

Ground level photographs were taken of each sampling point along with observations on height, growth stage, and general crop conditions.

Spectral signatures from the Si and PbS detectors were obtained by ratioing the target reflectance against the incoming radiation to give percentage reflectance. The HgCdTe detector data will be presented as apparent temperature.

This is one of a series of data reports; each will contain the data collected at the Yuma, Arizona test site since issuance of the previous report. A final analysis and summary will be issued after the study is completed.

Data was collected February 19-22, 1974 from the following targets: cabbage, broccoli, onions, poppy - 1, poppy - 3, bare ground, cauliflower, carrot, chick peas, poppy - 2, poppy - 4, and poppy - 6.



# FIELD NUMBERING SYSTEM

UNIVERSITY OF ARIZONA - YUMA VALLEY EXPERIMENT STATION

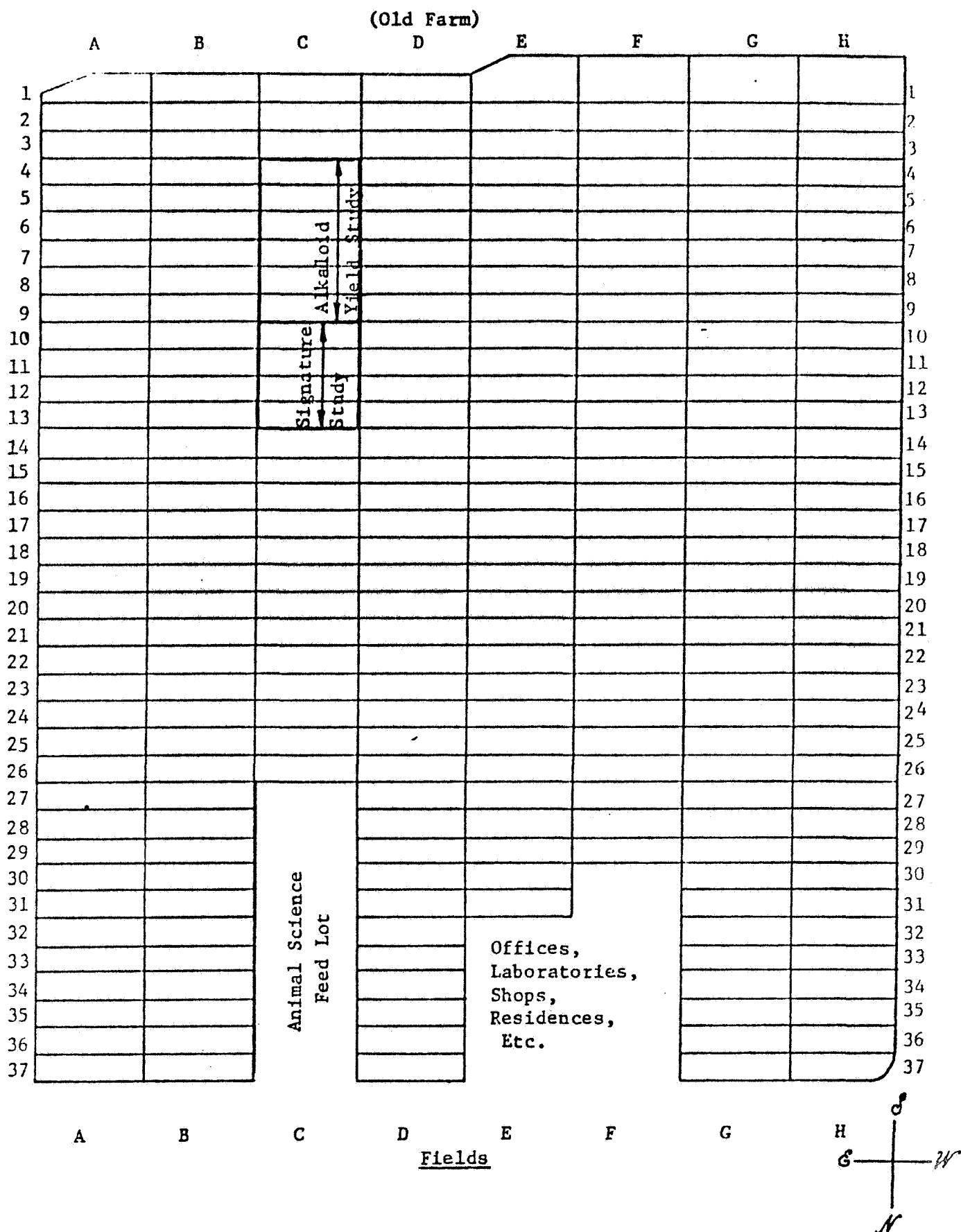


Figure 1 STATION PLAN

Spectral Signature Study  
 USDA, NASA, Lockheed and U of A Cooperating  
 Yuma, Ariz, 1973-74  
 Field C, Border 10-13

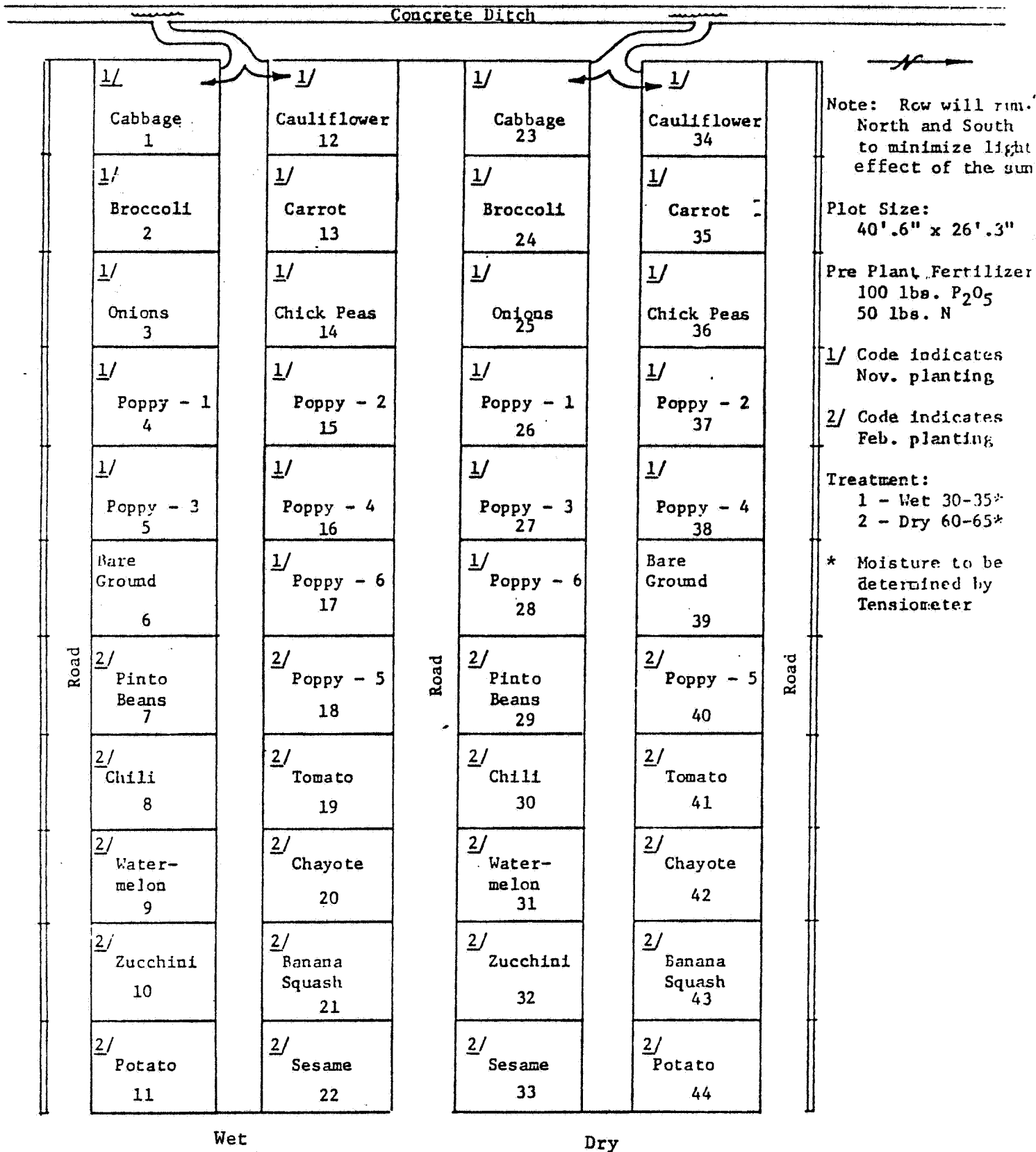
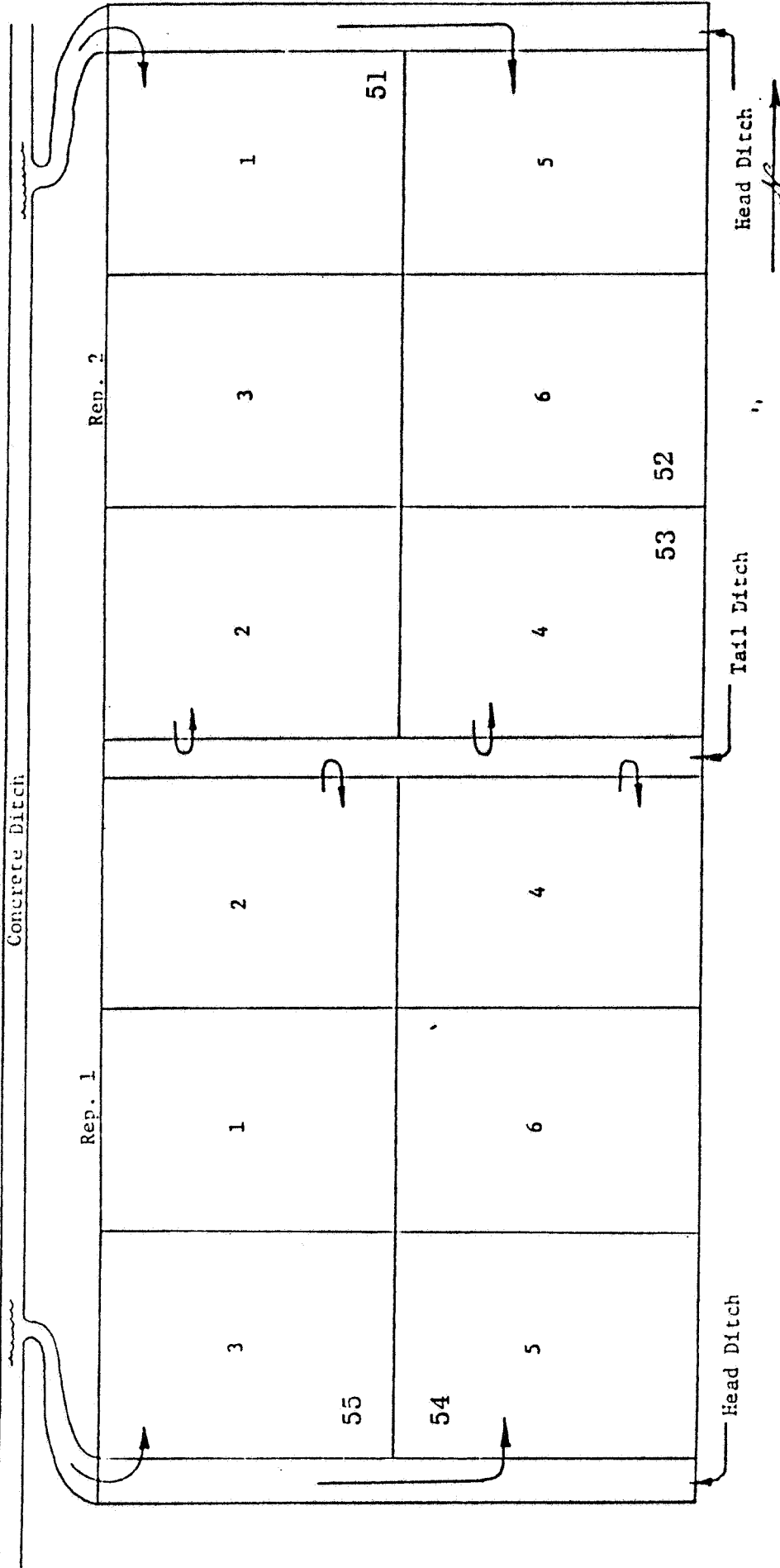


Figure 2 SIGNATURE STUDY PLAN

POPPY  
Alkaloid Yield Study  
USDA, U of A Cooperating  
Field C, Border 4-9



DATA  
POINT

- TREATMENT IDENTIFICATION
1. Variety 1 6 cm spacing
  2. Variety 1 12 cm spacing
  3. Variety 1 18 cm spacing
  4. Variety 2 6 cm spacing
  5. Variety 2 12 cm spacing
  6. Variety 2 18 cm spacing

Note: Rows will run North and South to minimize light effect of the sun.  
Plot Size: 140' x 60'  
Pre Plant Fertilizer: 100 lbs P<sub>2</sub>O<sub>5</sub> 50 lbs N  
Planting Date: November 7, 1973.  
Germination Irrigation: November 8, 1973

Figure 3 ALKALOID YIELD STUDY PLAN

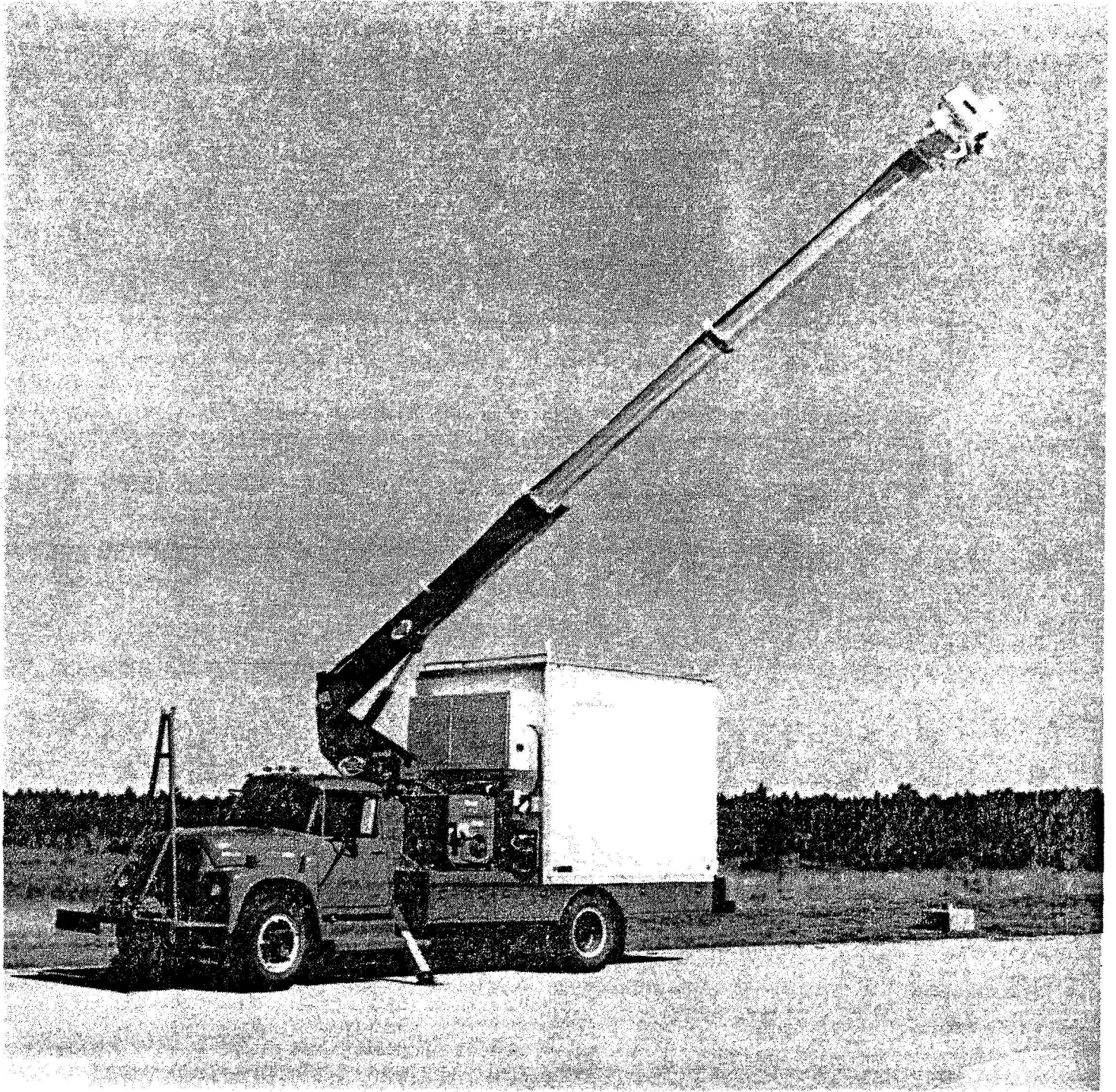


Figure 4 ERL REMOTE SENSING INSTRUMENTED VAN



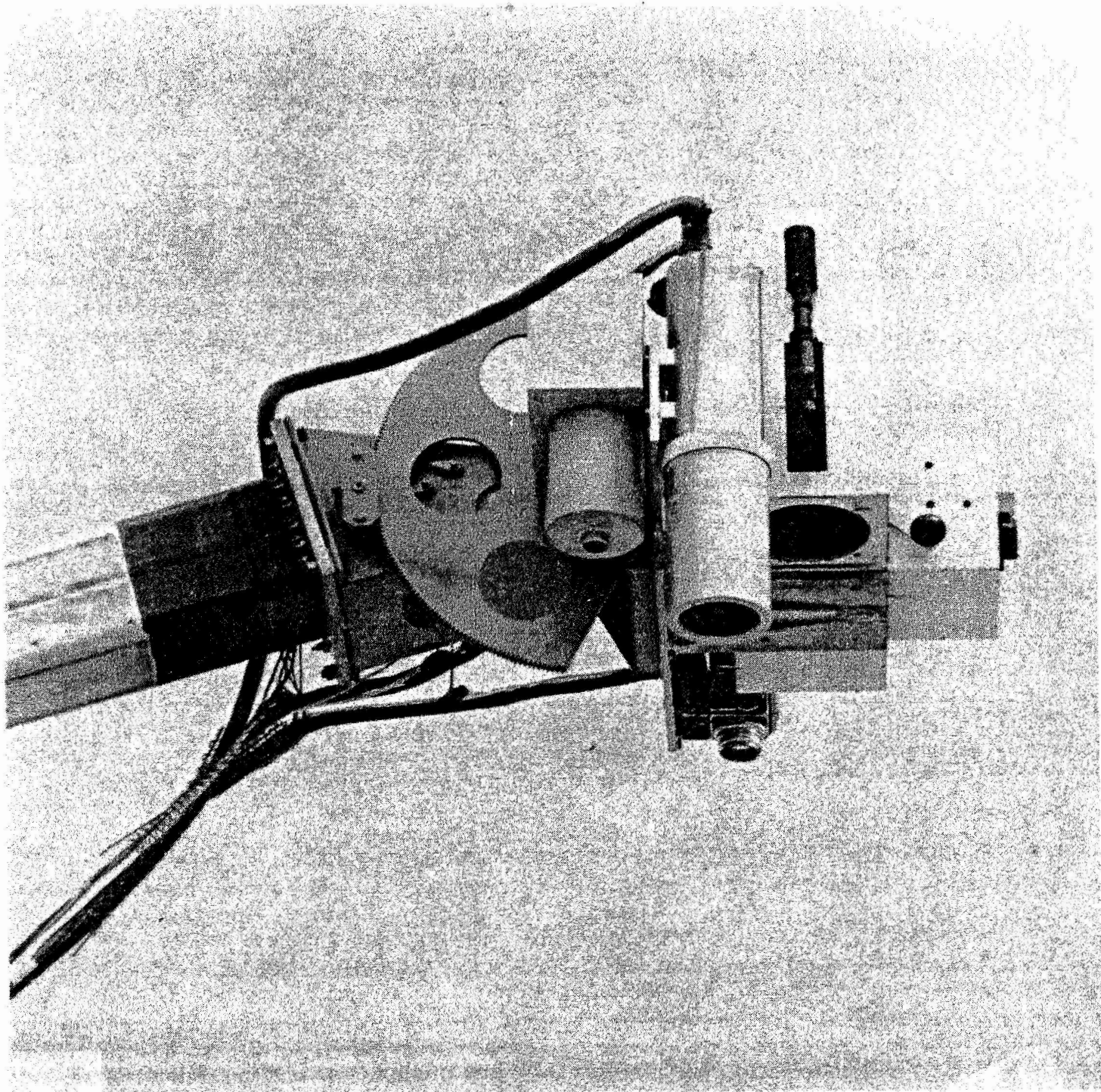
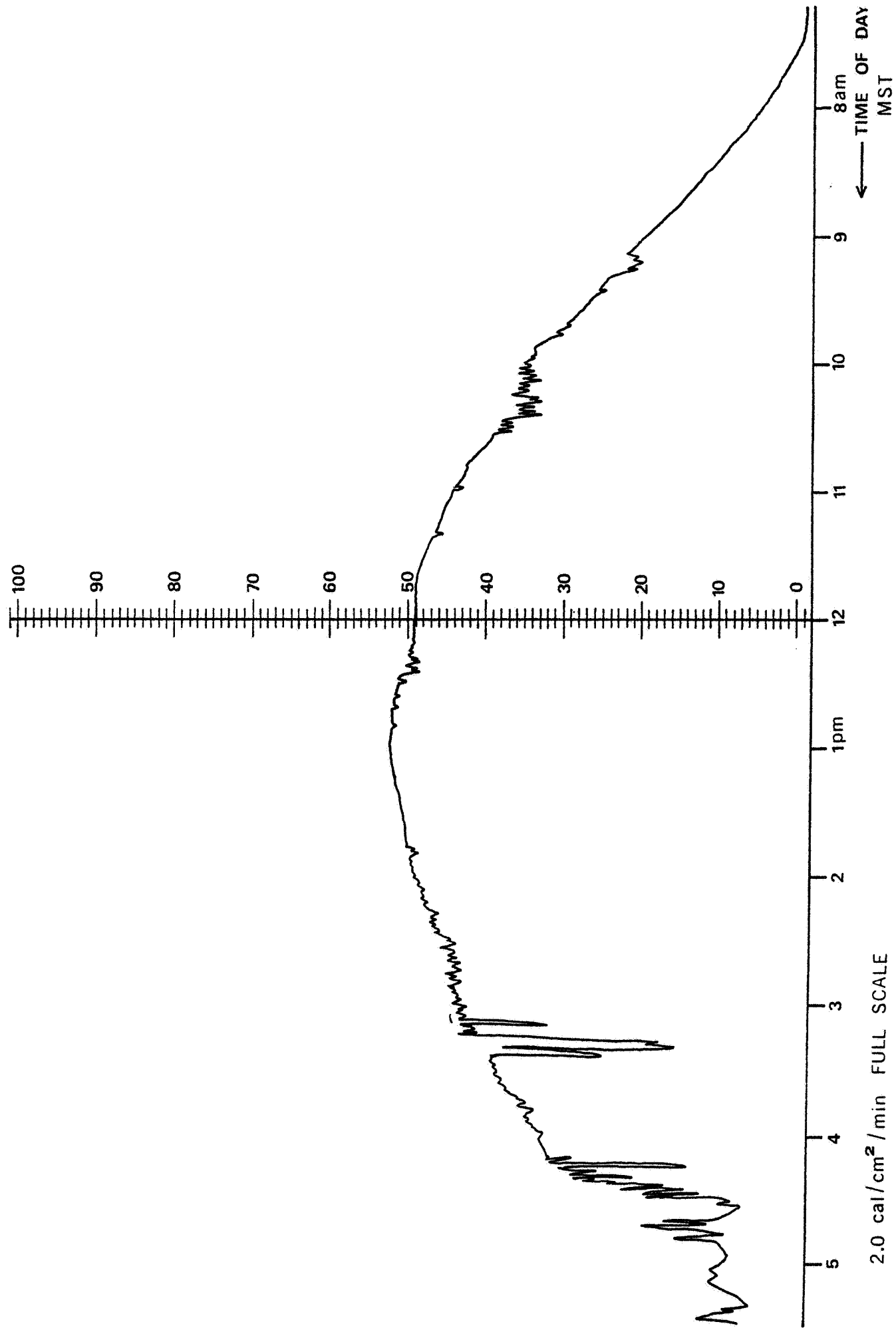
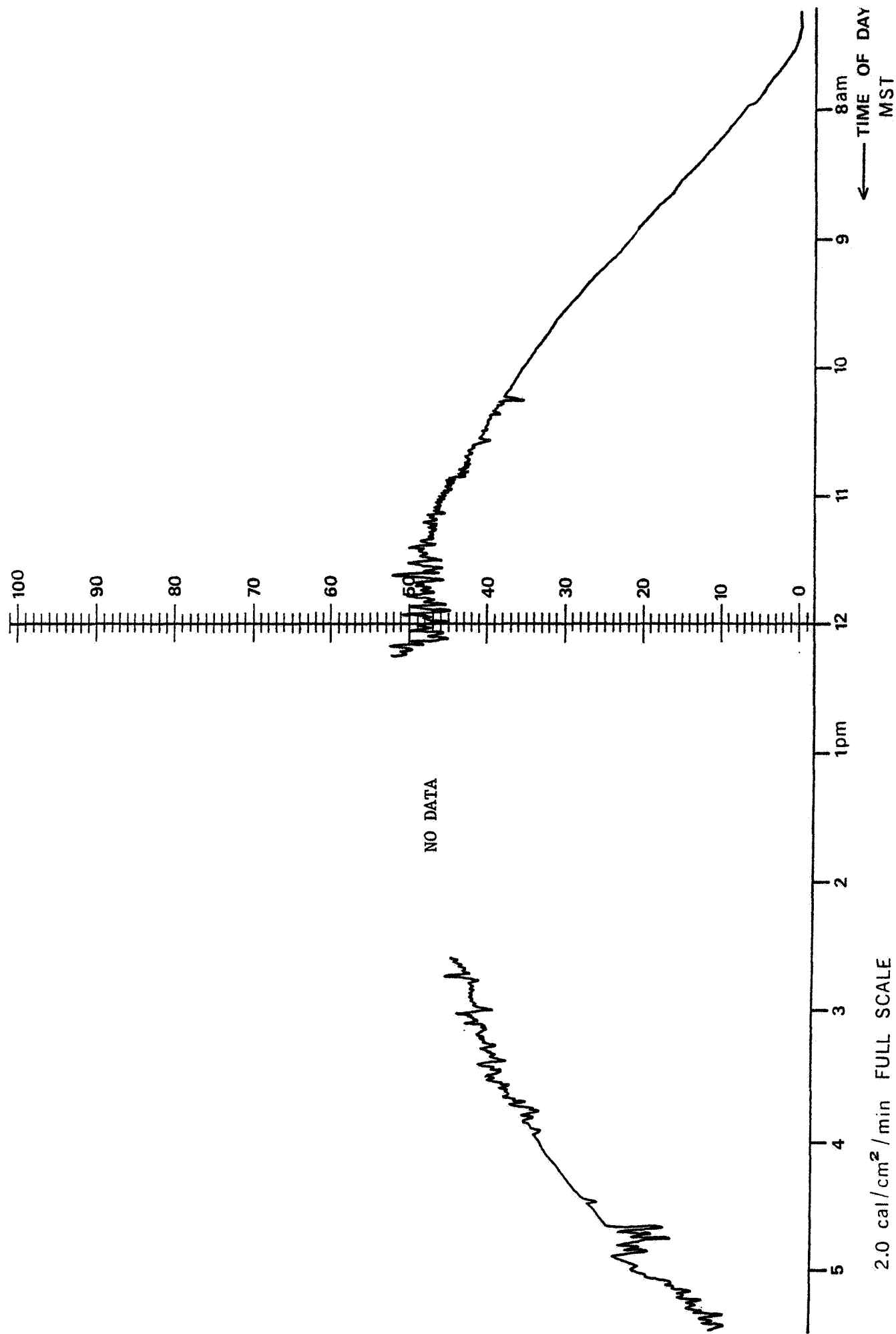


Figure 5 TRUCK BOOM MOUNTED SENSOR SYSTEM



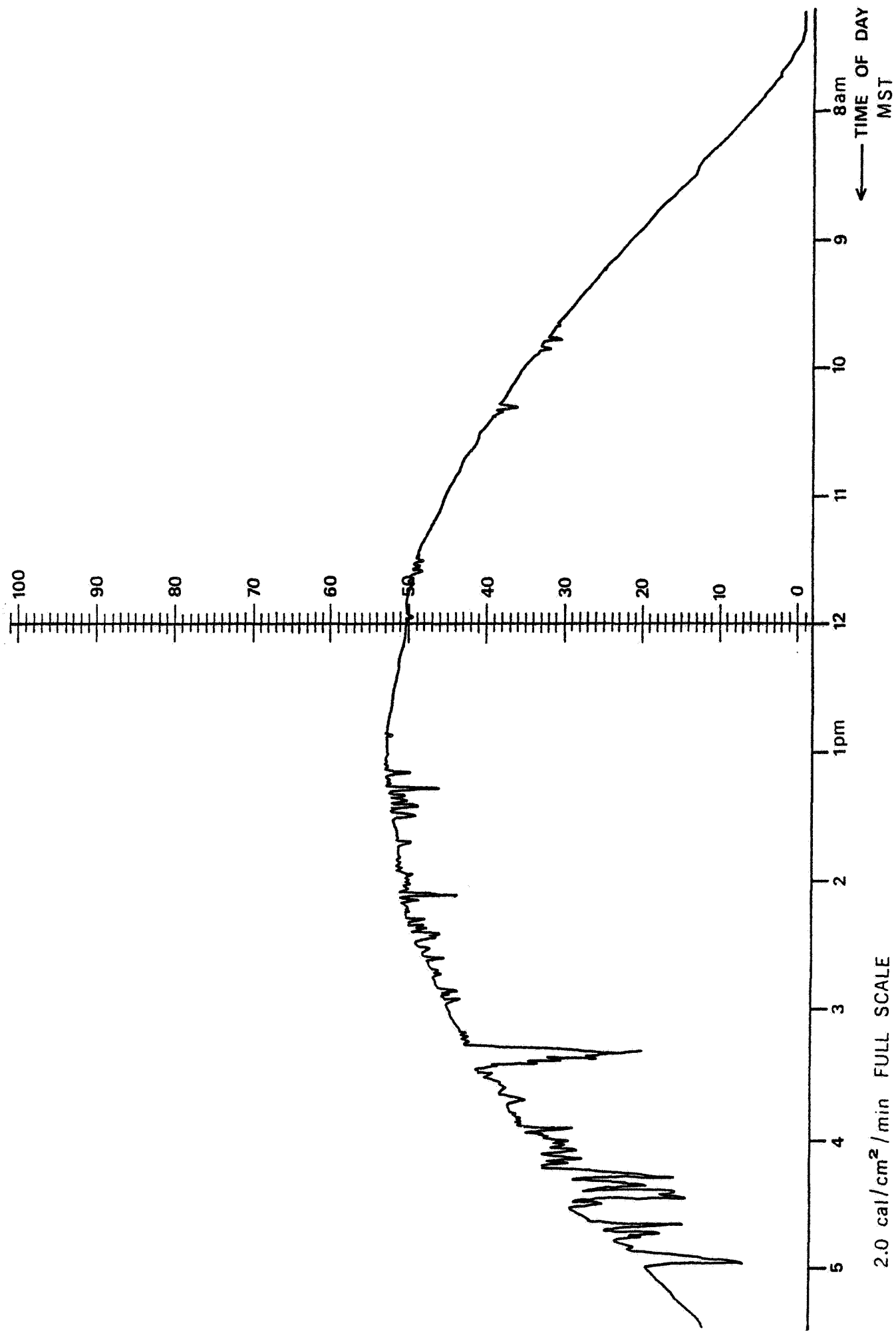
FEBRUARY 19, 1974

Figure 6 PYRANOMETER CURVE



FEBRUARY 20, 1974

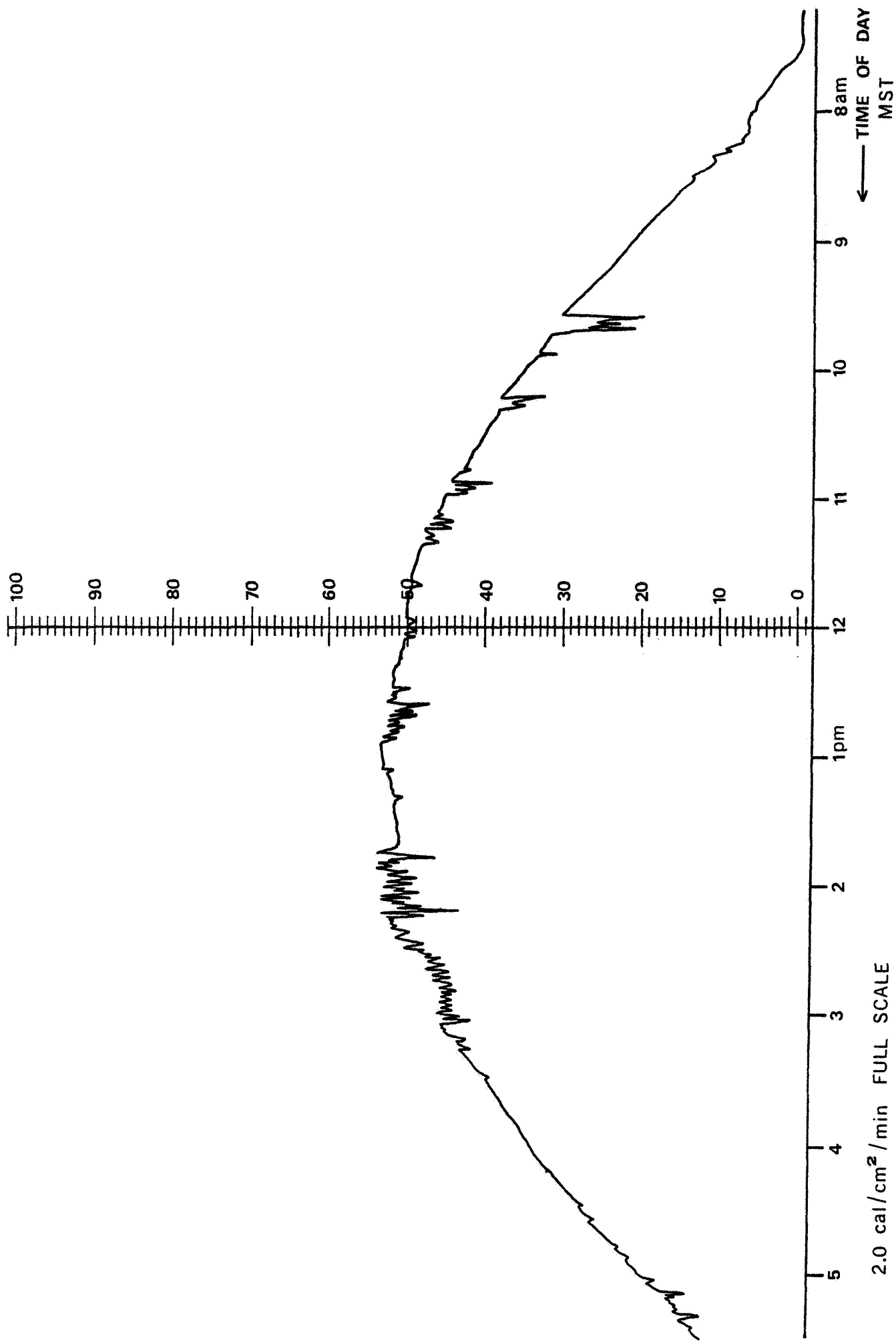
Figure 6 PYRANOMETER CURVE



FEBRUARY 21, 1974

Figure 6 PYRANOMETER CURVE





FEBRUARY 22, 1974

Figure 6 PYRANOMETER CURVE

Table 1 RELATIVE HUMIDITY and TEMPERATURE

FEBRUARY 19, 1974

TIME	2 FEET		5 FEET	
MST	R.H. %	TEMP. °F	R.H. %	TEMP. °F
7 am		NO DATA		
8 am		NO DATA		
9 am	68	55	64	53
10 am	56	58	52	56
11 am	54	62	46	60
12 am	50	65	47	63
1 pm	46	68	40	66
2 pm	46	71	40	68
3 pm	38	74	30	72
4 pm	30	74	35	72
5 pm	50	68	50	66
6 pm	58	62	58	61

Table 1 RELATIVE HUMIDITY and TEMPERATURE

FEBRUARY 20, 1974

TIME	2 FEET		5 FEET	
MST	R.H. %	TEMP. °F	R.H. %	TEMP. °F
7 am	60	48	45	48
8 am	48	50	44	51
9 am	46	53	36	54
10 am	38	57	31	57
11 am	37	60	30	58
12 am	36	61	29	60
1 pm	34	62	28	61
2 pm	33	64	28	62
3 pm	32	64	26	62
4 pm	30	64	25	62
5 pm	30	63	26	61
6 pm	31	60	27	59

Table 1     RELATIVE HUMIDITY and TEMPERATURE

FEBRUARY 21, 1974

TIME	2 FEET		5 FEET	
MST	R.H. %	TEMP. °F	R.H. %	TEMP. °F
7 am	45	47	38	47
8 am	46	47	38	48
9 am	44	52	37	52
10 am	42	55	36	54
11 am	41	58	35	56
12 am	40	60	34	58
1 pm	38	62	30	60
2 pm	36	64	28	62
3 pm	32	65	27	62
4 pm	32	66	28	63
5 pm	34	64	30	62
6 pm	42	61	33	58

Table 1 RELATIVE HUMIDITY and TEMPERATURE

FEBRUARY 22, 1974

TIME	2 FEET		5 FEET	
MST	R.H. %	TEMP. °F	R.H. %	TEMP. °F
7 am	98	32	85	35
8 am	95	34	62	38
9 am	68	43	45	48
10 am	50	55	35	55
11 am	42	60	30	59
12 am	38	63	27	62
1 pm	34	65	24	65
2 pm	32	66	22	67
3 pm	26	69	20	68
4 pm	24	70	24	70
5 pm	30	71	32	70
6 pm	41	71	45	66

## PLOT DETAILS

THIS SECTION CONTAINS FOR EACH PLOT THE FOLLOWING DETAILS :

- CROP HISTORY
- GROUND LEVEL PHOTO
- BORESIGHT PHOTO
- GROUND TRUTH DATA
- SPECTROMETER CURVE

PLOT NO. 1

CABBAGE

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2 rows on 40" beds with 12" spacing
Nov 9, 1973	Irrigated
Nov 12, 1973	First emergence
Nov 15, 1973	*Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 12"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 4, 1974	Irrigated
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated
Feb 20, 1974	Irrigated

PLOT NO. 1

CABBAGE

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
12, 1973	2	5	Moist	Normal	-
18, 1973	2.5	2	Dry	Thinning-shock Slightly wilted	Thinned Dec 17, 1973
3, 1974	4	5	Moist 1.5" down	Cold-wilted	-
10, 1974	5	17	Moist .5" down	Normal	-
14, 1974	5	20	Wet	Normal	-
25, 1974	6	25	Moist 1" down	Normal	5% weeds salt on rows - Jan 21, 1974
30, 1974	7	25	Moist 2" down	Normal	-
7, 1974	9	25	Wet	Normal	Irrigated Feb 4, No weeds
14, 1974	10	27	Moist 1" down	Normal	-
22, 1974	10	28	-	Normal	-



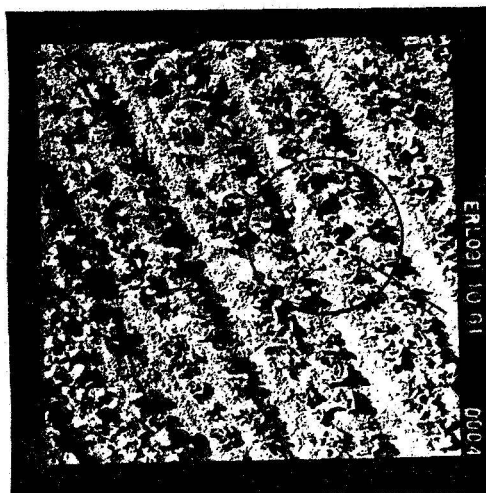
PLOT NO. 1

CABBAGE

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

Circle represents spectrometer signature

PLOT NO. 2

BROCCOLI

CROP HISTORY

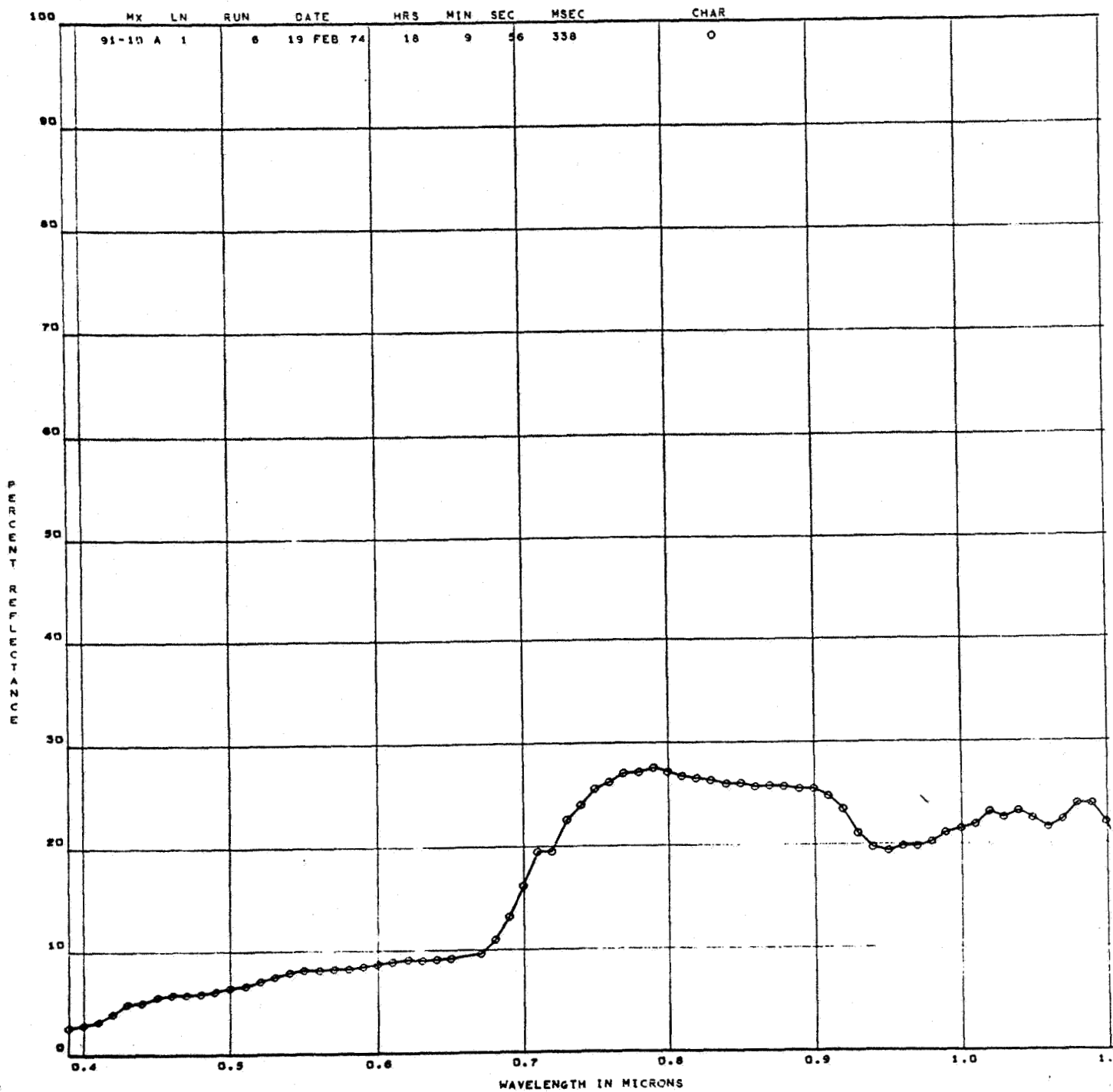
Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2 rows on 40" beds with 12" spacing
Nov 9, 1973	Irrigated
Nov 12, 1973	First emergence
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 14"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 4, 1974	Irrigated
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated
Feb 20, 1974	Irrigated

PLOT NO. 1

CABBAGE

SPECTROMETER SIGNATURE

U1108/SC41  
0010 01



PLOT NO. 2

BROCCOLI

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 12, 1973	2	5	Moist	Normal	-
Dec 18, 1973	2.5	2	Moist 1" down	Thinning-shock Slightly wilted	Thinned Dec 17, 1973
Jan 3, 1974	4	5	Moist 1.5" down	Cold-wilted	-
Jan 10, 1974	5	15	Moist .5" down	Normal	-
Jan 14, 1974	6	18	Wet	Normal	-
Jan 25, 1974	8	22	Moist 1" down	Normal	Tens. = 20 salt on row Jan 21, 1974
Jan 30, 1974	9	24	Moist 2" down	Normal	-
Feb 7, 1974	10	30	Wet	Normal	Irrigated Feb 4, No weeds, Tens. = 30
Feb 14, 1974	12	31	Moist 1" down	Normal	-
Feb 22, 1974	14	38	-	Normal	Tens. = 20 on Feb 15, 36 Feb 19, 50 Feb 20

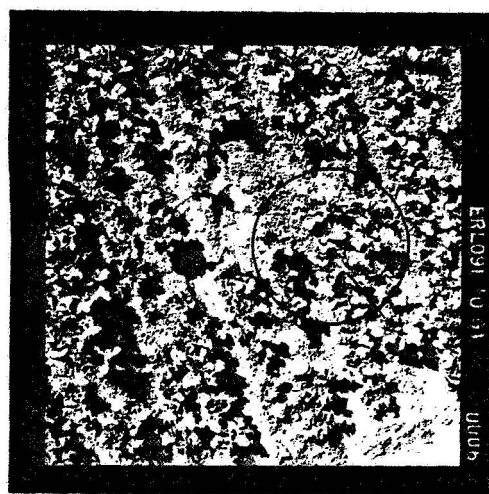
PLOT NO. 2

BROCCOLI

FEBRUARY 19, 1974



GROUND LEVEL



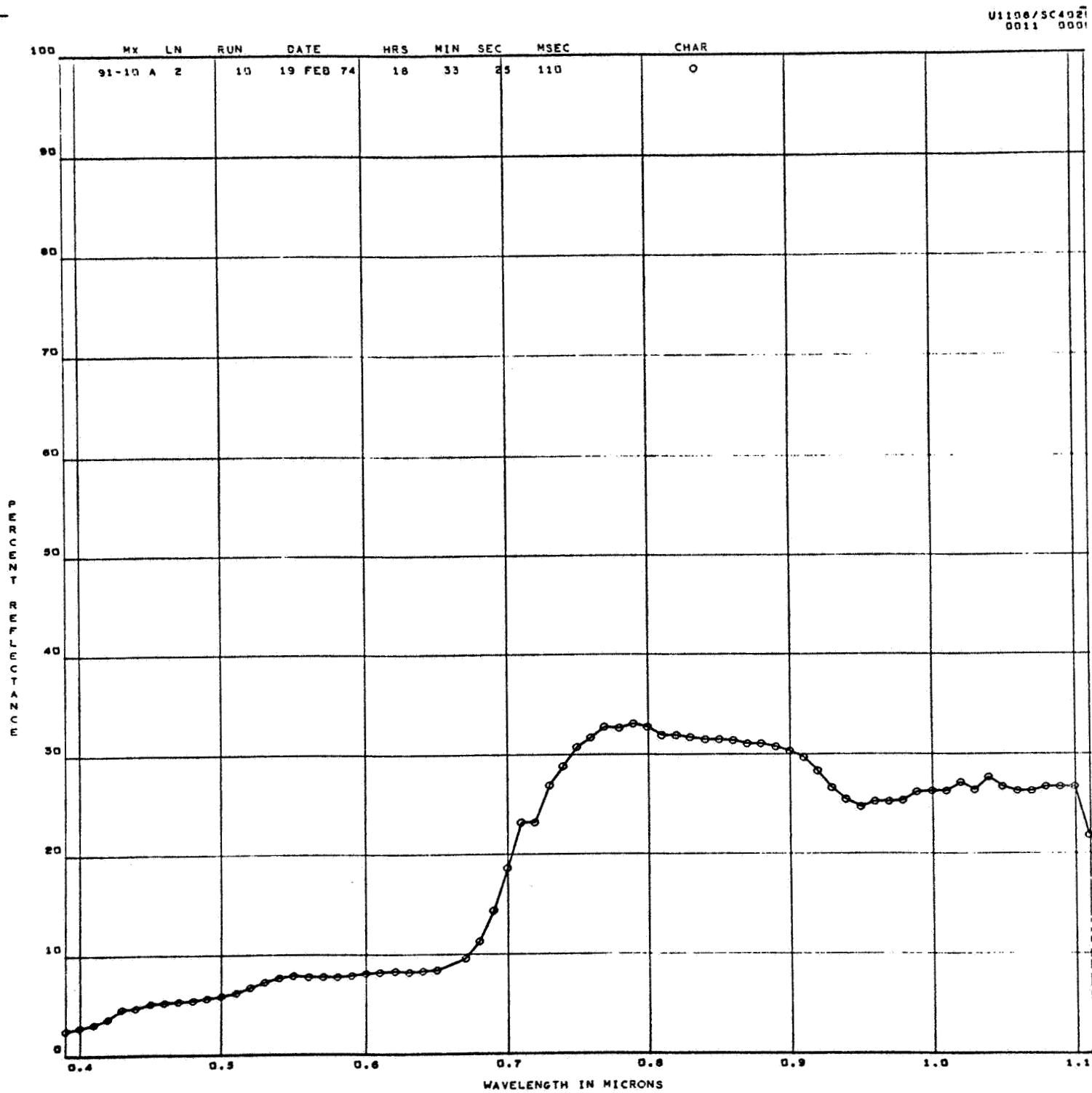
BORESIGHT

Circle represents spectrometer signature

PLOT NO. 2

BROCCOLI

SPECTROMETER SIGNATURE



PLOT NO. 3

ONIONS

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 4 rows on 40" beds with 4-8-4" spacing
Nov 9, 1973	Irrigated
Nov 21, 1973	Irrigated
Nov 26, 1973	First emergence
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Hand weeded - Irrigated
Jan 28, 1974	Hoeed weeds
Jan 29, 1974	Disced fallow portion
Feb 4, 1974	Irrigated
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated
Feb 20, 1974	Irrigated

PLOT NO. 3

ONIONS

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 12, 1973	-	1	Moist	Normal	-
Dec 18, 1973	.5	1	Moist 1" down	Wilted	-
Jan 3, 1974	3.5	2	Moist 1.5" down	Cold-wilt	-
Jan 10, 1974	3	10	Moist .5" down	Normal	-
Jan 14, 1974	4	8	Wet	Normal	Weeded, Thinned
Jan 25, 1974	6	15	Moist 1" down	Normal	Jan 14, 1974 Salt on rows Jan 21, 1974
Jan 30, 1974	7	15	Moist 2" down	Normal	-
Feb 7, 1974	8	17	Wet	Normal	Irrigated Feb 4, No weeds
Feb 14, 1974	8	17	Moist 1" down	Normal	-
Feb 22, 1974	10	18	-	Normal	-



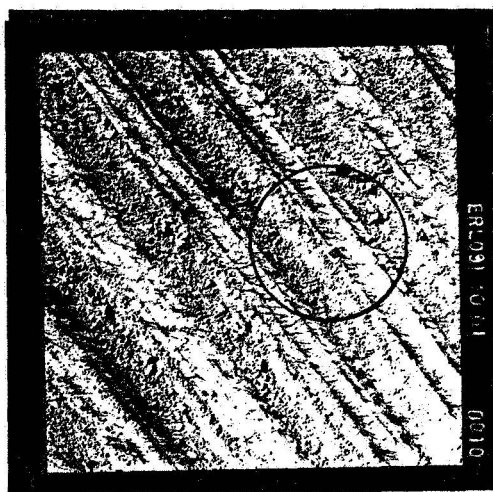
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ONIONS

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

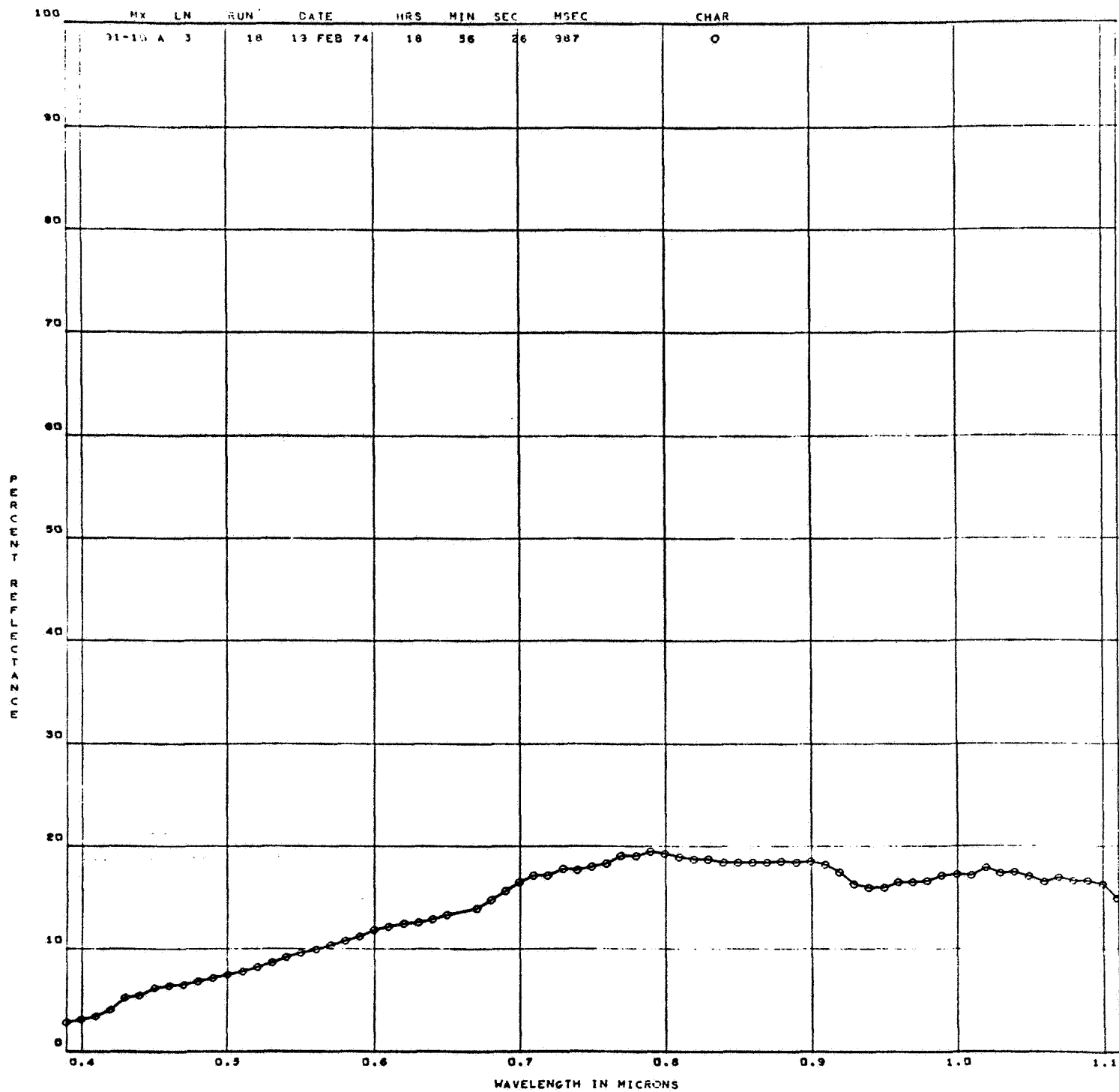
Circle represents spectrometer signature

PLOT NO. 3

ONIONS

SPECTROMETER SIGNATURE

U110R/SC4021  
0012 0000



PLOT NO. 4

POPPY - 1  
(Acquisition No. B-40-6-3)

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2 rows on 40" beds with 12" spacing and 9" between plants in drill
Nov 9, 1973	Irrigated
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 9"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 4, 1974	Irrigated
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated
Feb 20, 1974	Irrigated

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	.5	1	Moist 1" down	Wilted	Thinned Dec 17
Jan 3, 1974	1.5	5	Moist 1.5" down	-	-
Jan 10, 1974	2	12	Moist .5" down	Normal	-
Jan 14, 1974	3	22	Wet	Normal	-
Jan 25, 1974	5	27	Moist 1" down	Normal	Salt on rows Jan 21, 1974
Jan 30, 1974	7	27	Moist 2" down	Normal	-
Feb 7, 1974	10	30	Wet	Normal	No weeds
Feb 14, 1974	13	40	Moist 1" down	Normal	-
Feb 22, 1974	16	49	-	Normal	-

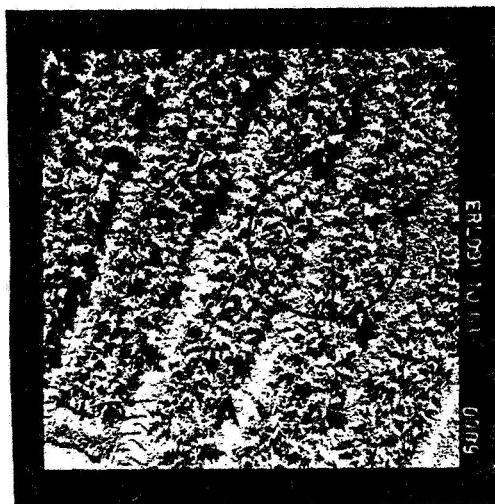
PLOT NO. 4

POPPY-1

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

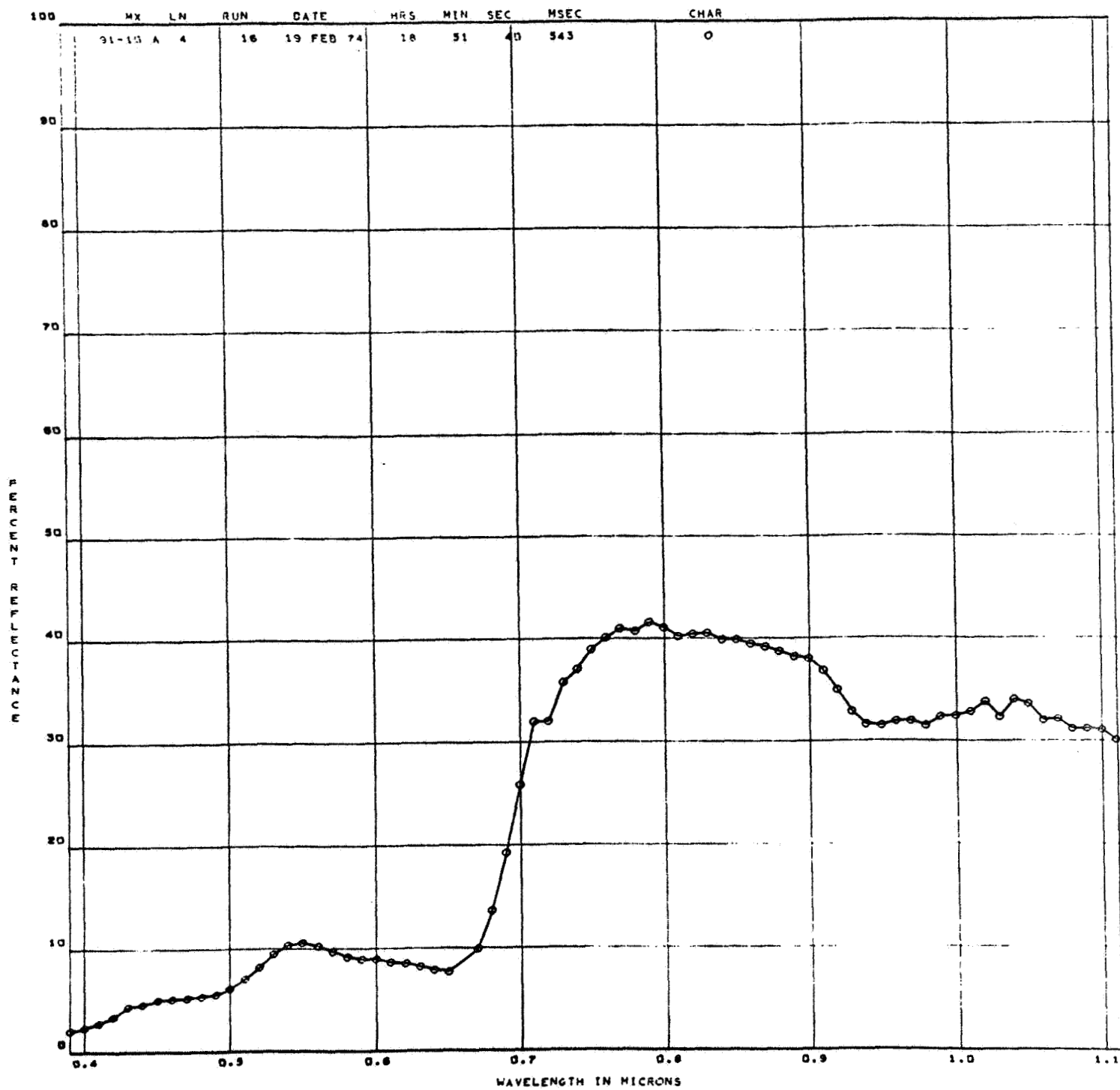
Circle represents spectrometer signature

PLOT NO. 4

POPPY-1

SPECTROMETER SIGNATURE

U1108/SC4027  
0013 0000



PLOT NO. 5

POPPY - 3  
(Acquisition No. 371923)

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2 rows on 40" beds with 12" spacing and 9" between plants in drill
Nov 9, 1973	Irrigated
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 9"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 4, 1974	Irrigated
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated
Feb 20, 1974	Irrigated

PLOT NO. 5

POPPY-3  
(Acquisition No. 371923)

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	.5	1	Moist 1" down	Wilted	Thinned Dec 17
Jan 3, 1974	-	-	Moist 1.5" down	-	-
Jan 10, 1974	2	12	Moist 1.5" down	Normal	-
Jan 14, 1974	3	22	Wet	Normal	-
Jan 25, 1974	4	25	Moist 1" down	Normal	Salt on rows Jan 21, 1974
Jan 30, 1974	5	25	Moist 2" down	Normal	-
Feb 7, 1974	8	30	Wet	Normal	No weeds
Feb 14, 1974	10	35	Moist 1" down	Normal	Beginning to bud
Feb 22, 1974	15	48	-	Normal	-



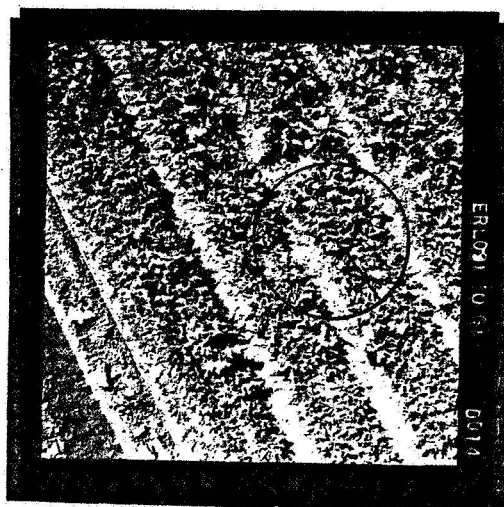
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POPPY-3

FEBRUARY 19, 1974



GROUND LEVEL



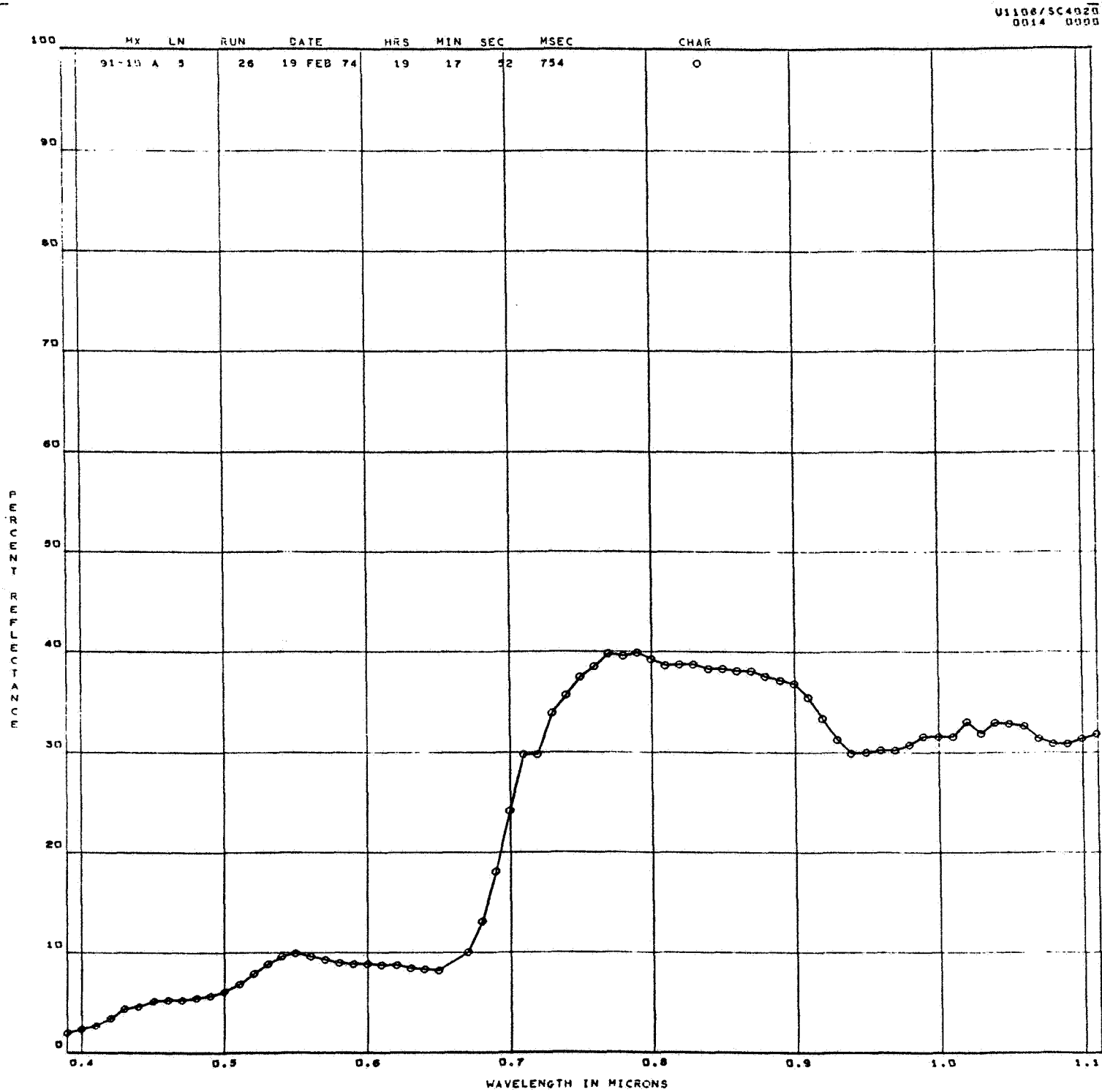
BORESIGHT

Circle represents spectrometer signature

PLOT NO. 5

POPPY-3

SPECTROMETER SIGNATURE



PLOT NO. 6

BARE GROUND  
(WET)

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Dec 7, 1973	Fertilized with 50 lbs N/Ac-Irrigated
Dec 26, 1973	Cultivated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated
Feb 20, 1974	Irrigated

PLOT NO. 6

BARE GROUND  
(WET)

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 12, 1973	-	-	Moist	-	-
Dec 18, 1973	-	-	Moist 1" down	-	-
Jan 3, 1974	-	-	Dry at 6"	-	-
Jan 10, 1974	-	-	Moist .5" down	-	No weeds
Jan 14, 1974	-	-	Dry	-	No weeds
Jan 25, 1974	-	0	Moist 1" down	-	No weeds
					Salt on rows Jan 21, 1974
Jan 30, 1974	-	-	Dry	-	-
Feb 7, 1974	-	-	Dry	-	No weeds
Feb 14, 1974	-	-	-	-	-
Feb 22, 1974	-	0	-	-	-

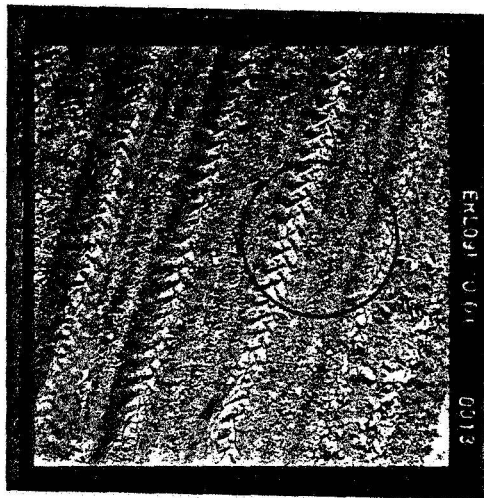
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BARE GROUND  
(WET)

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

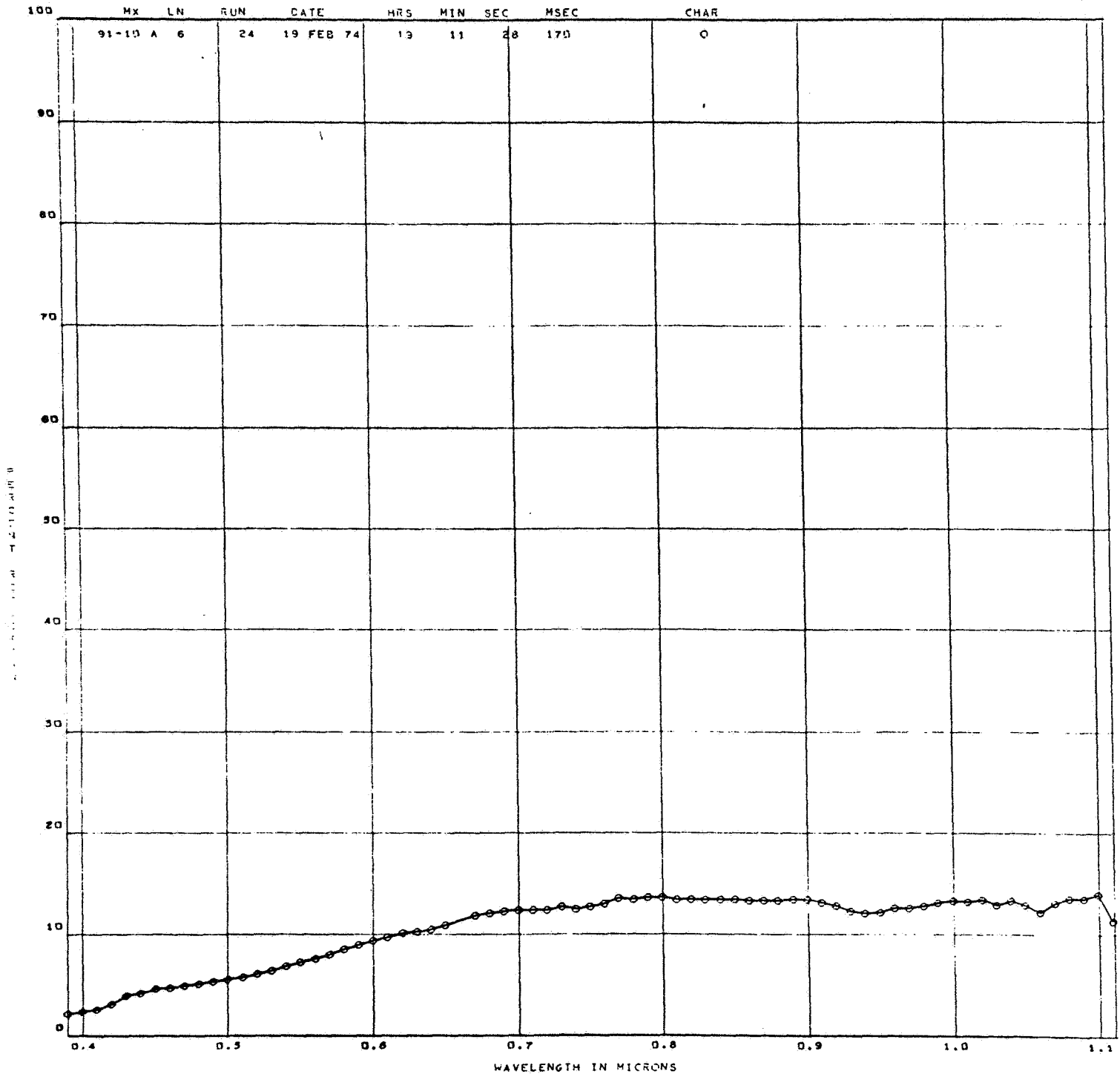
Circle represents spectrometer signature

PLOT NO. 6

BARE GROUND  
(WET)

SPECTROMETER SIGNATURE

U1100/SC4020  
0019 0000



PLOT NO. 12

CAULIFLOWER

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2 rows on 40" beds with 12" spacing and 24" spacing in drill
Nov 9, 1973	Irrigated
Nov 13, 1973	First emergence
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 24"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1973	Hoed weeds
Jan 28, 1974	Disced fallow portion
Feb 4, 1974	Irrigated
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated
Feb 20, 1974	Irrigated

PLOT NO. 12

CAULIFLOWER

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 12, 1973	1	6	Moist	Normal	-
Dec 18, 1973	2.5	2	Moist 1" down	Wilted	Thinned Dec 17
Jan 3, 1974	4	-	Moist 1.5" down	Cold-wilted	Few weeds
Jan 10, 1974	6	12	Moist .5" down	Normal	-
Jan 14, 1974	6.5	15	Wet	Normal	-
Jan 25, 1974	9	30	Moist 1" down	Normal	5% weeds Salt on row Jan 21, 1974
Jan 30, 1974	9	25	Moist 2" down	Normal	-
Feb 7, 1974	12	25	Wet	Normal	No weeds
Feb 14, 1974	13	27	Moist 1" down	Normal	-
Feb 22, 1974	15	28	-	Normal	-



PLOT NO. 13

CARROT

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 4 rows on 40" beds with 4-8-4" spacing
Nov 9, 1973	Irrigated
Nov 21, 1973	Irrigated
Nov 26, 1973	First emergence
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated - Sprayed with Lorax
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 4, 1974	Irrigated
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated
Feb 20, 1974	Irrigated

PLOT NO. 13

CARROT

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 12, 1973	.25	-	Moist	Normal	-
Dec 18, 1973	.5	1	Moist 1" down	Normal	-
Jan 3, 1974	1	10	Moist 1.5" down	Normal	1% Weeds
Jan 10, 1974	2	30	Moist .5" down	Normal	10% Weeds
Jan 14, 1974	2	20	Wet	Normal	7% Weeds
Jan 25, 1974	4	31	Moist 1" down	Normal	1% Weeds, Tens.= 12 Salt on rows Jan 21, 1974
Jan 30, 1974	2	31	Moist 2" down	Normal	-
Feb 7, 1974	5	35	Wet	Normal	No weeds, tens.=34
Feb 14, 1974	7	40	Moist 1" down	Normal	-
Feb 22, 1974	8	46	-	Normal	Small white blossoms. Tens.= 10 on Feb 11 15 Feb 13, 14 Feb 15, 28 Feb 19, 37 Feb 20

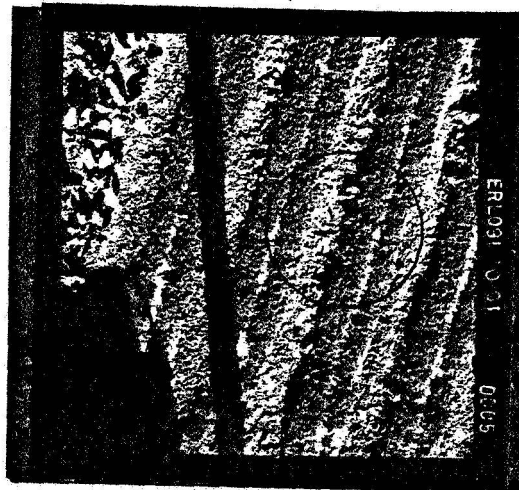
PLOT NO. 13

CARROT

FEBRUARY 19, 1974



GROUND LEVEL



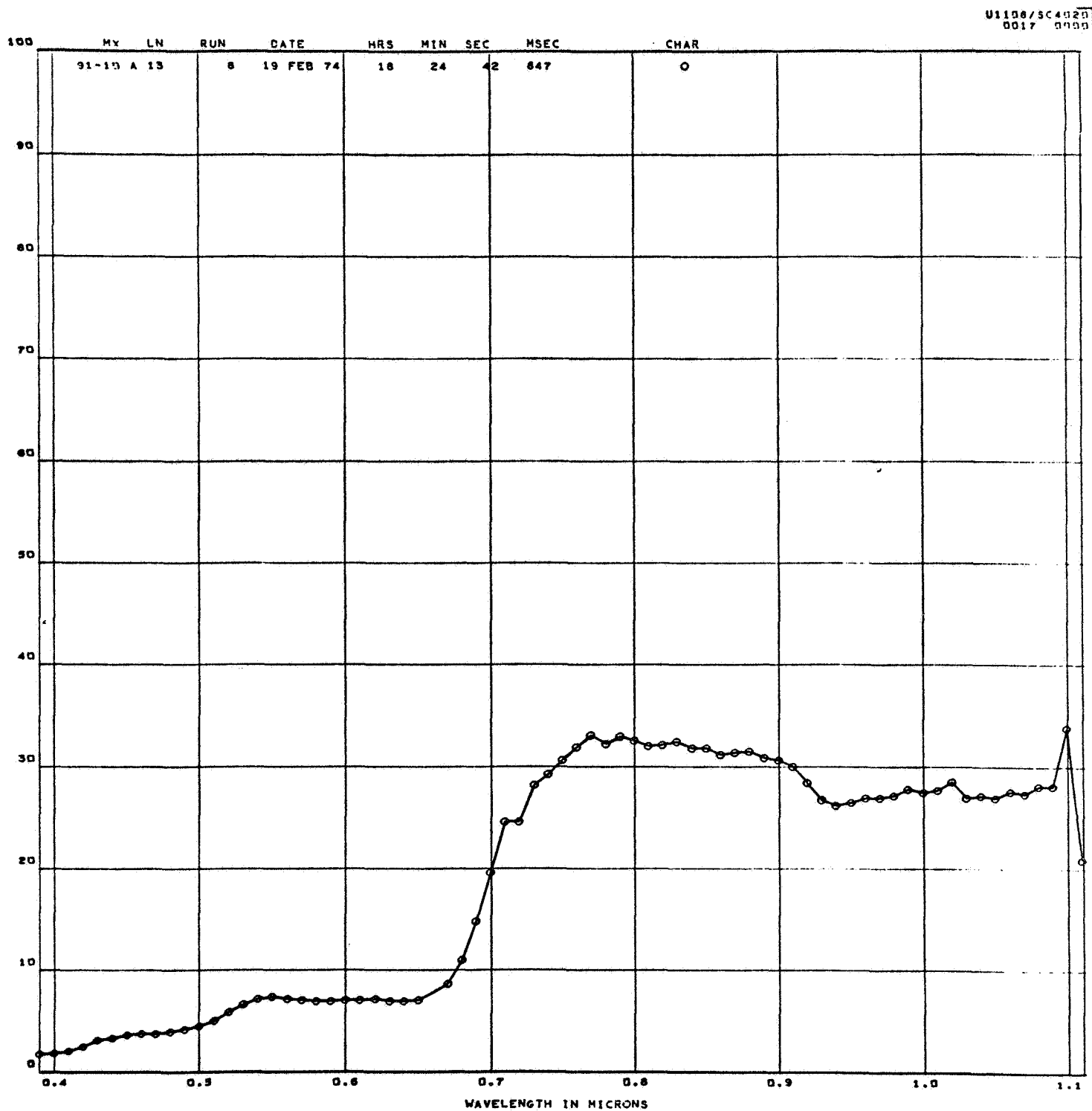
BORESIGHT

Circle represents spectrometer signature

PLOT NO. 13

CARROT

SPECTROMETER SIGNATURE



PLOT NO. 14

CHICK PEAS

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Dec 4, 1973	Planted 2 rows on 40" beds with 12" spacing
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 26, 1973	First emergence - Cultivated
Jan 7, 1974	Poor stand
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Transplanted for proper stand -- Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 4, 1974	Irrigated
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated
Feb 20, 1974	Irrigated

PLOT NO. 14

CHICK PEAS

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 12, 1973	-	-	Moist	-	-
Dec 18, 1973	-	0	Moist 1" down	-	-
Jan 3, 1974	1-2	2	Moist 1.5" down	Normal	-
Jan 10, 1974	2.5	3	Moist .5" down	Normal	Poor stand
Jan 14, 1974	4	6	Wet	Normal	Transplanted for
Jan 25, 1974	4	10	Moist 1" down	Normal	good stand
					Salt on rows -
					Jan 21, 1974
Jan 30, 1974	5	8	Moist 2" down	Normal	-
Feb 7, 1974	7	20	Wet	Normal	No weeds
Feb 14, 1974	8	20	Moist 1" down	Normal	Beginning to bloom.
					poor stand
Feb 22, 1974	10	24	-	Normal	-

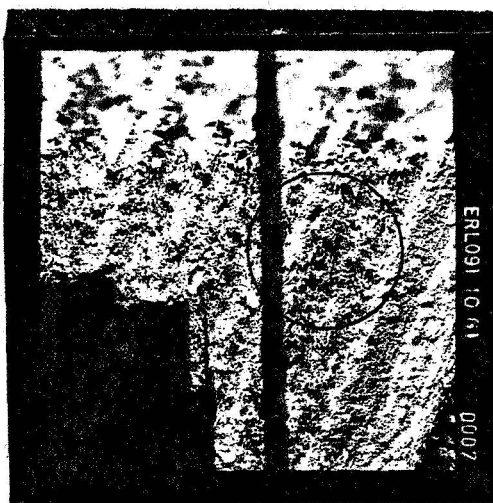
PLOT NO. 14

CHICK PEAS

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

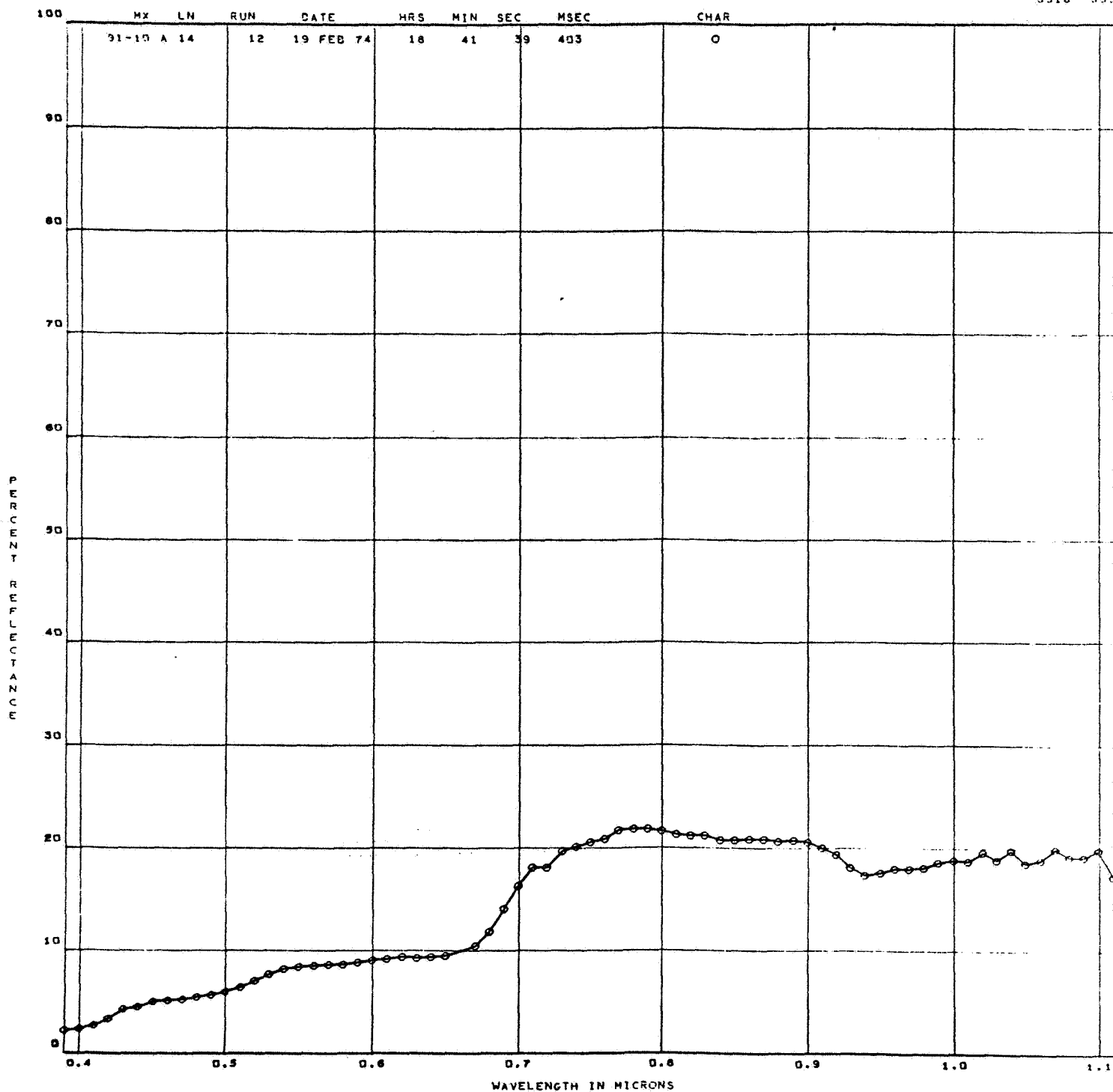
Circle represents spectrometer signature

PLOT NO. 14

CHICK PEAS

SPECTROMETER SIGNATURE

U1108/SC412  
0018 000





PLOT NO. 15

POPPY - 2  
(Acquisition No. M-89)

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2 rows on 40" beds with 12" spacing and 9" spacing in drill
Nov 9, 1973	Irrigated
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 9"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 4, 1974	Irrigated
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated
Feb 20, 1974	Irrigated

PLOT NO. 15

POPPY-2  
(Acquisition No. M-89)

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	1	1	Moist 1" down	Wilted	Thinned Dec 17
Jan 3, 1974	1.5	5	Moist 1.5" down	Normal	-
Jan 10, 1974	2	10	Moist .5" down	Normal	-
Jan 14, 1974	3	22	Wet	Normal	-
Jan 25, 1974	5	23	Moist 1" down	Normal	Salt on rows - Jan 21, 1974
Jan 30, 1974	6	25	Moist 2" down	Normal	-
Feb 7, 1974	8	45	Wet	Normal	No weeds, tens.=38
Feb 14, 1974	12	40	Moist 1" down	Normal	-
Feb 22, 1974	16	52	-	Normal	Tens.= 13 on Feb 11, 16 Feb 13, 19 Feb 15, 32 Feb 19, 38 Feb 20

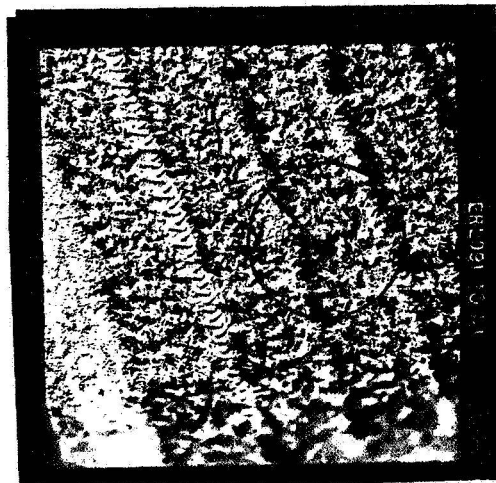
PLOT NO. 15

POPPY-2

FEBRUARY 19, 1974



GROUND LEVEL



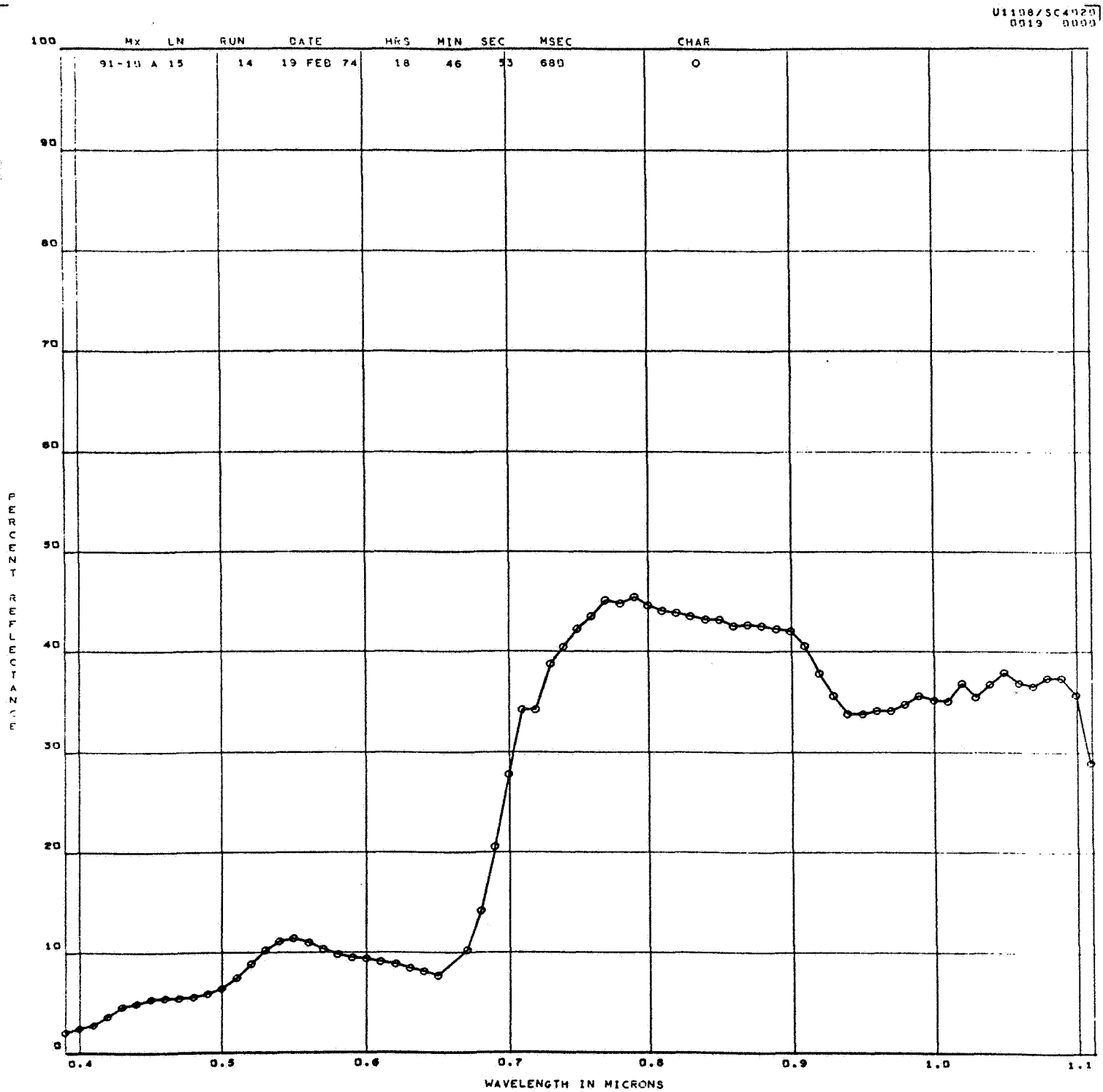
BORESIGHT

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PLOT NO. 15

POPPY -2

SPECTROMETER SIGNATURE



PLOT NO. 16

POPPY - 4  
(Mixture of Poppy 1,2,3)

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2 rows on 40" beds with 12" spacing and 9" spacing in drill
Nov 9, 1973	Irrigated
Nov 13, 1973	First emergence
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 9"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 4, 1974	Irrigated
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated
Feb 20, 1974	Irrigated

PLOT NO. 16

POPPY-4  
(Mixture of 1,2,3 )

GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 12, 1973	.5	-	Moist	Normal	-
Dec 18, 1973	1	1	Moist 1" down	Normal	Thinned Dec 12
Jan 3, 1974	1	3	Moist 1.5" down	Normal	-
Jan 10, 1974	2	10	Moist .5" down	Normal	-
Jan 14, 1974	2.5	20	Wet	Normal	-
Jan 25, 1974	4	20	Moist 1" down	Normal	Salt on rows - Jan 21, 1974
Jan 30, 1974	6	23	Moist 2" down	Normal	-
Feb 7, 1974	7	35	Wet	Normal	No weeds
Feb 14, 1974	10	35	Moist 1" down	Normal	-
Feb 22, 1974	15	49	-	Normal	-

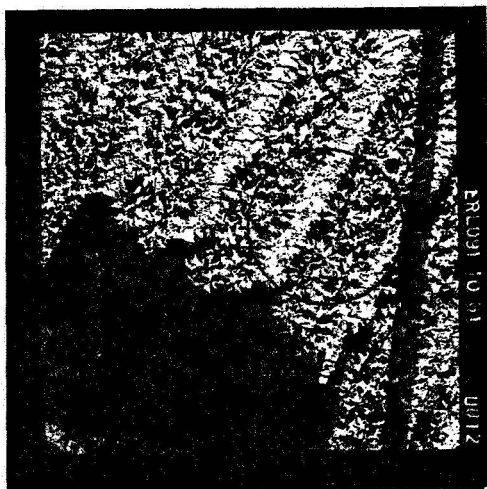
PLOT NO. 16

POPPY-4

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

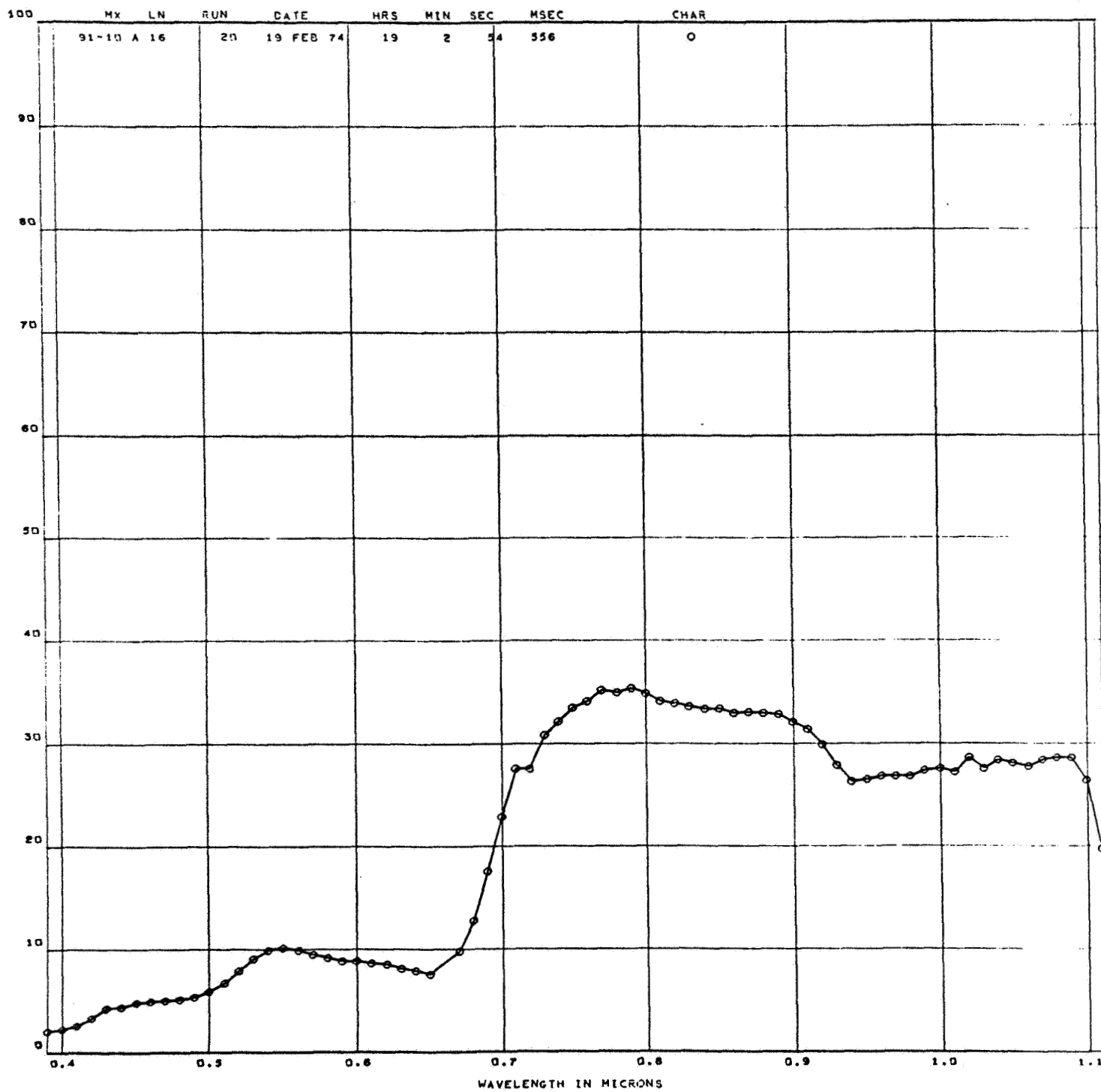
Circle represents spectrometer signature

PLOT NO. 16

POPPY-4

SPECTROMETER SIGNATURE

U1108/SC4020  
0020 0000





PLOT NO. 17

POPPY - 6  
(Acquisition No. B-40-6-3)

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2 rows on 40" beds with 12" spacing and 9" spacing in drill
Nov 9, 1973	Irrigated
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 9"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 4, 1974	Irrigated
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated
Feb 20, 1974	Irrigated

# GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	1	1	Moist 1" down	Wilted	Thinned Dec 12
Jan 3, 1974	1-2	4	Moist 1.5" down	Normal	-
Jan 10, 1974	2	10	Moist 1.5" down	Normal	-
Jan 14, 1974	2.5	20	Wet	Normal	-
Jan 25, 1974	5	22	Moist 1" down	Normal	Salt on rows Jan 21, 1974
Jan 30, 1974	6	35	Moist 2" down	Normal	-
Feb 7, 1974	7	30	Wet	Normal	No weeds
Feb 14, 1974	11	38	Moist 1" down	Normal	-
Feb 22, 1974	14.5	48	-	Normal	-

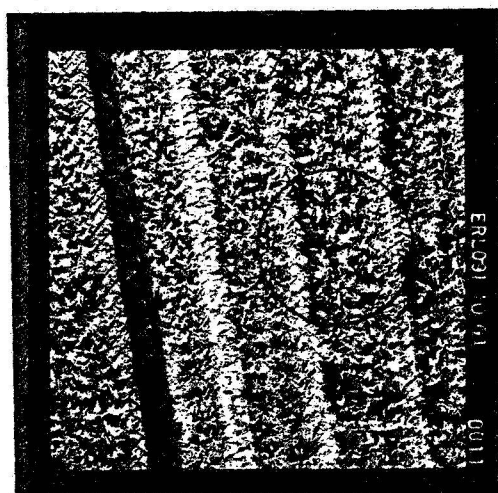
PLOT NO. 17

POPPY-6

FEBRUARY 19, 1974



GROUND LEVEL



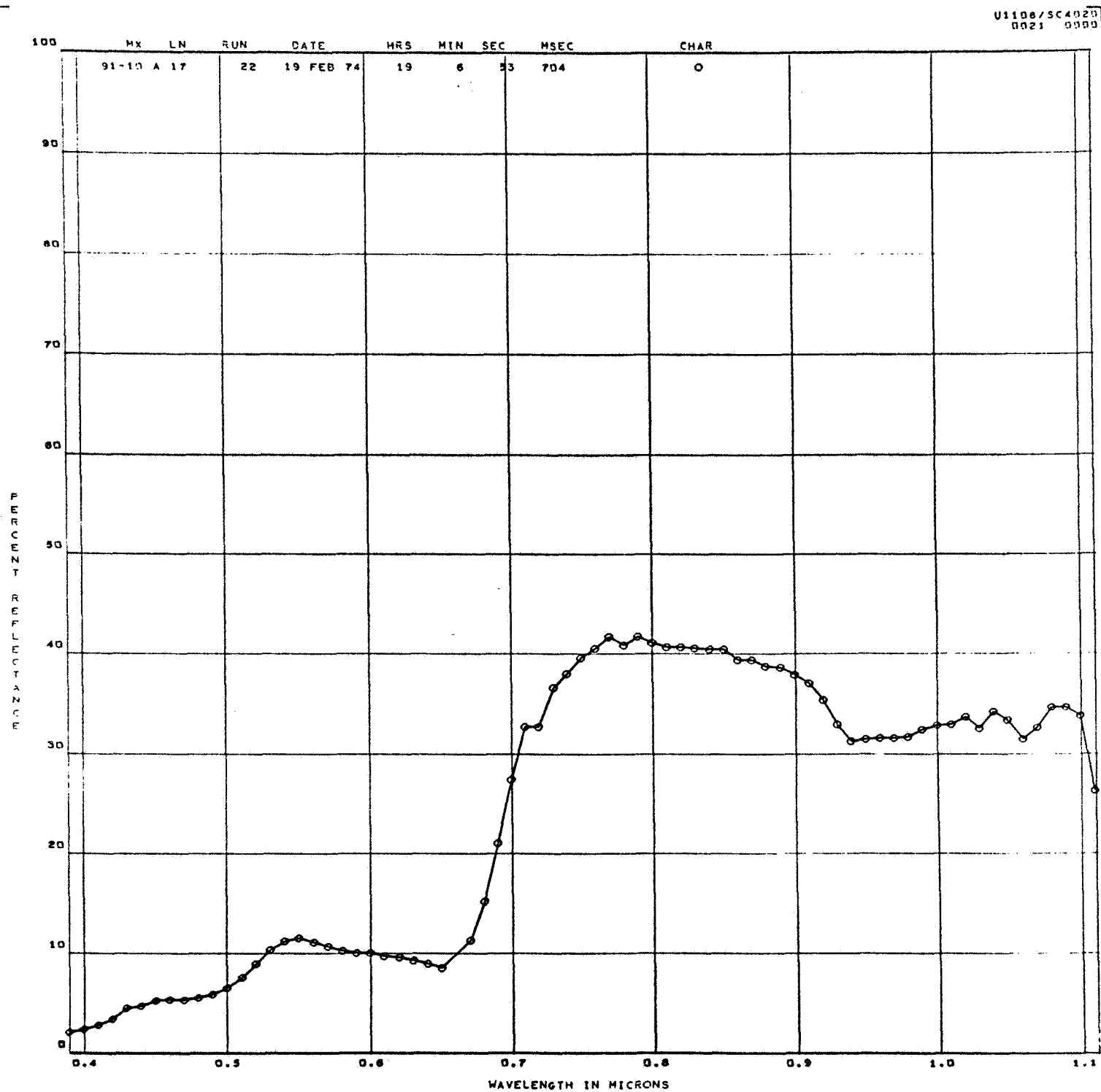
BORESIGHT

Circle represents spectrometer signature

PLOT NO. 17

POPPY-6

SPECTROMETER SIGNATURE



PLOT NO. 23

CABBAGE

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2 rows on 40" beds with 12" spacing
Nov 9, 1973	Irrigated
Nov 12, 1973	First emergence
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 12"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hood weeds
Jan 29, 1974	Disced fallow portion
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	1	1	Moist 1" down	Wilted	Thinned Dec 17 1973
Jan 3, 1974	3-4	2	Moist 1.5" down	Normal	-
Jan 10, 1974	5	17	Moist .5" down	Normal	-
Jan 14, 1974	5	20	Wet	Normal	-
Jan 25, 1974	5	17	Moist 3" down	Normal	Salt on rows - Jan 21, 1974
Jan 30, 1974	5	15	Moist 2" down	Normal	-
Feb 7, 1974	6	20	Dry	Normal	No weeds
Feb 14, 1974	7	20	Dry	Normal	-
Feb 22, 1974	7	22	-	Normal	-

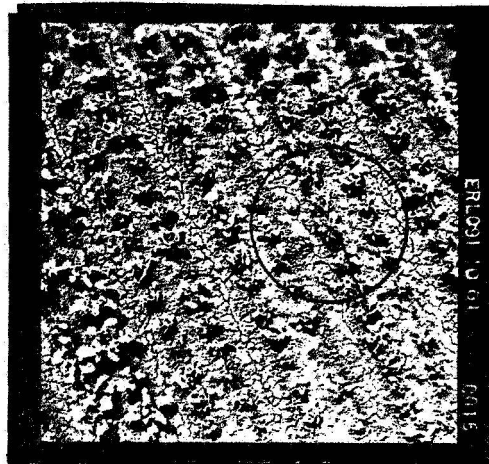
PLOT NO. 23

CABBAGE

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

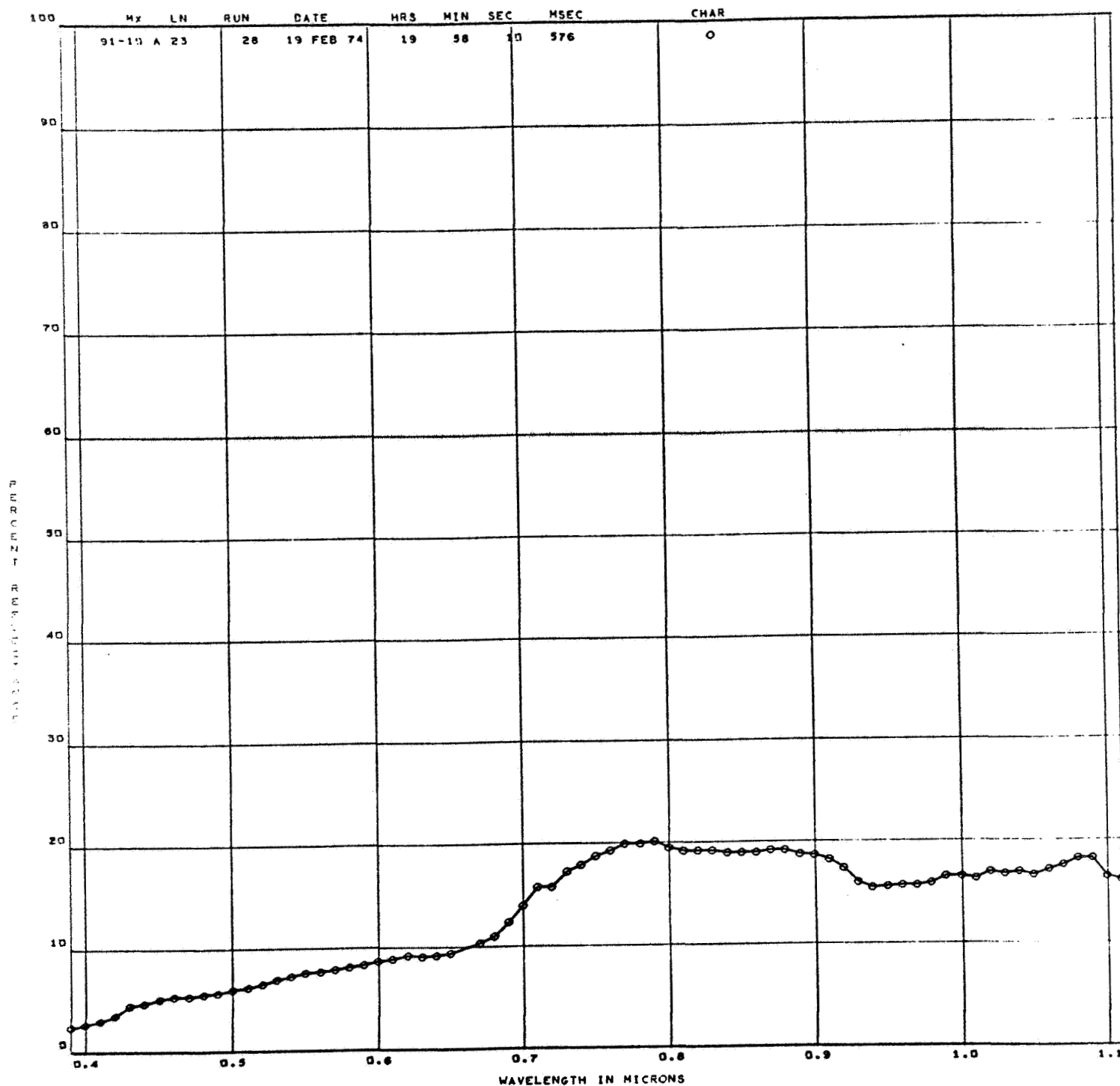
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PLOT NO. 23

CABBAGE

SPECTROMETER SIGNATURE

U1108/SC4020  
0022 0000





PLOT NO. 24

BROCCOLI

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2 rows on 40" beds with 12" spacing
Nov 9, 1973	Irrigated
Nov 12, 1973	First emergence
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 14"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

PLOT NO. 24

BROCCOLI

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	1	1	Moist 1" down	Wilted	Thinned Dec 17
Jan 3, 1974	3	1	Moist 1.5" down	Normal	-
Jan 10, 1974	5	15	Moist 1.5" down	Normal	-
Jan 14, 1974	6	18	Wet	Normal	-
Jan 25, 1974	5	17	Moist 3" down	Normal	Time = 3 5% weeds, Salt on row Jan 21, 1974
Jan 30, 1974	7	17	Moist 2" down	Normal	-
Feb 7, 1974	8	20	Dry	Normal	No weeds, tens.=30
Feb 14, 1974	9	25	Dry	Normal	-
Feb 22, 1974	10	27	-	Normal	Tens.= 61 on Feb 11, 66 Feb 13, 67 Feb 15 12 Feb 20

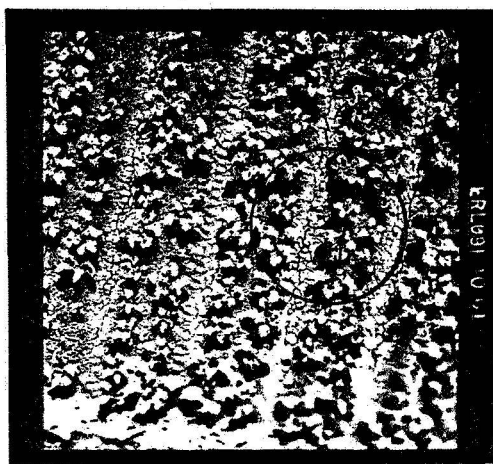
PLOT NO. 24

BROCCOLI

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

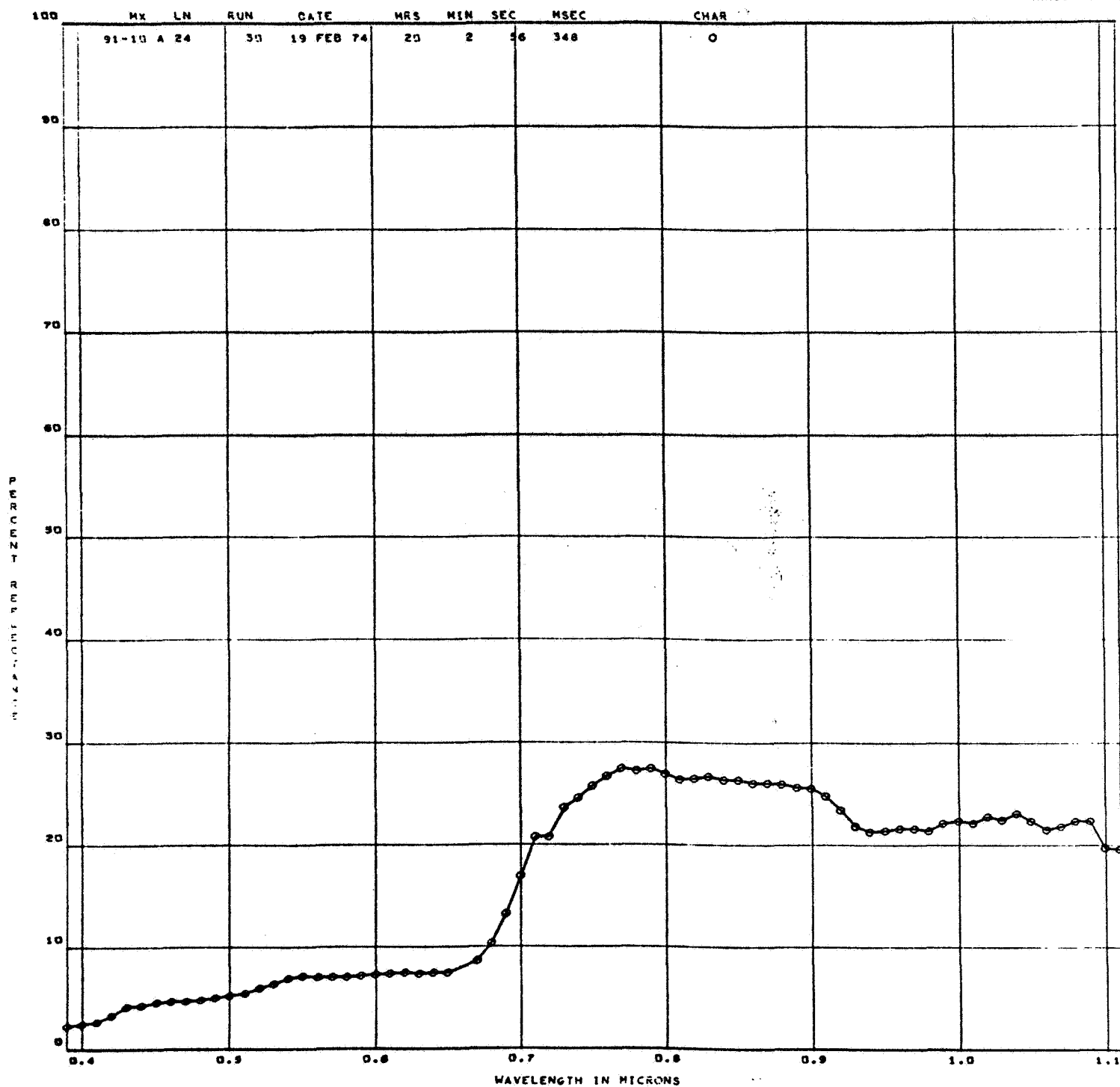
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PLOT NO. 24

BROCCOLI

SPECTROMETER SIGNATURE

U1100/SC4020  
0023 0000



PLOT NO. 25

ONIONS

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 4 rows on 40" beds with 4-8-4" spacing
Nov 9, 1973	Irrigated
Nov 21, 1973	Irrigated
Nov 26, 1973	First emergence
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Hand weeded - Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

PLOT NO. 25

ONIONS

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	1	3	Moist 1" down	Sprouts emerging	-
Jan 3, 1974	2-3	4	Moist 1.5" down	Normal	-
Jan 10, 1974	3	15	Moist .5" down	Normal	5% Weeds
Jan 14, 1974	4	8	Wet	Normal	Thinned and weeded Jan 14, 1974
Jan 25, 1974	6	8	Moist 3" down	Normal	Salt on rows - Jan 21, 1974
Jan 30, 1974	7	10	Moist 2" down	Normal	-
Feb. 7, 1974	7	10	Dry	Normal	No weeds
Feb 14, 1974	9	12	Dry	Normal	-
Feb 22, 1974	9.5	14	-	Normal	-

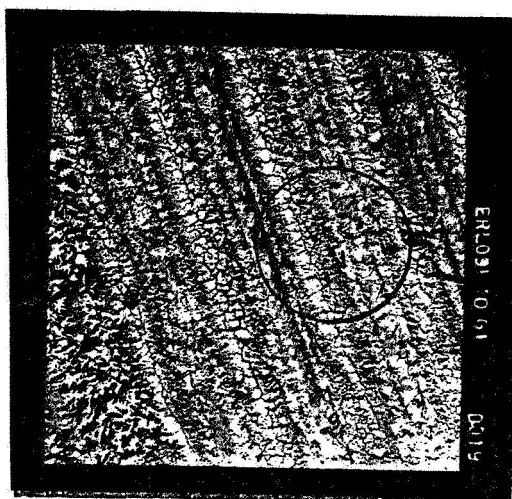
PLOT NO. 25

ONIONS

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

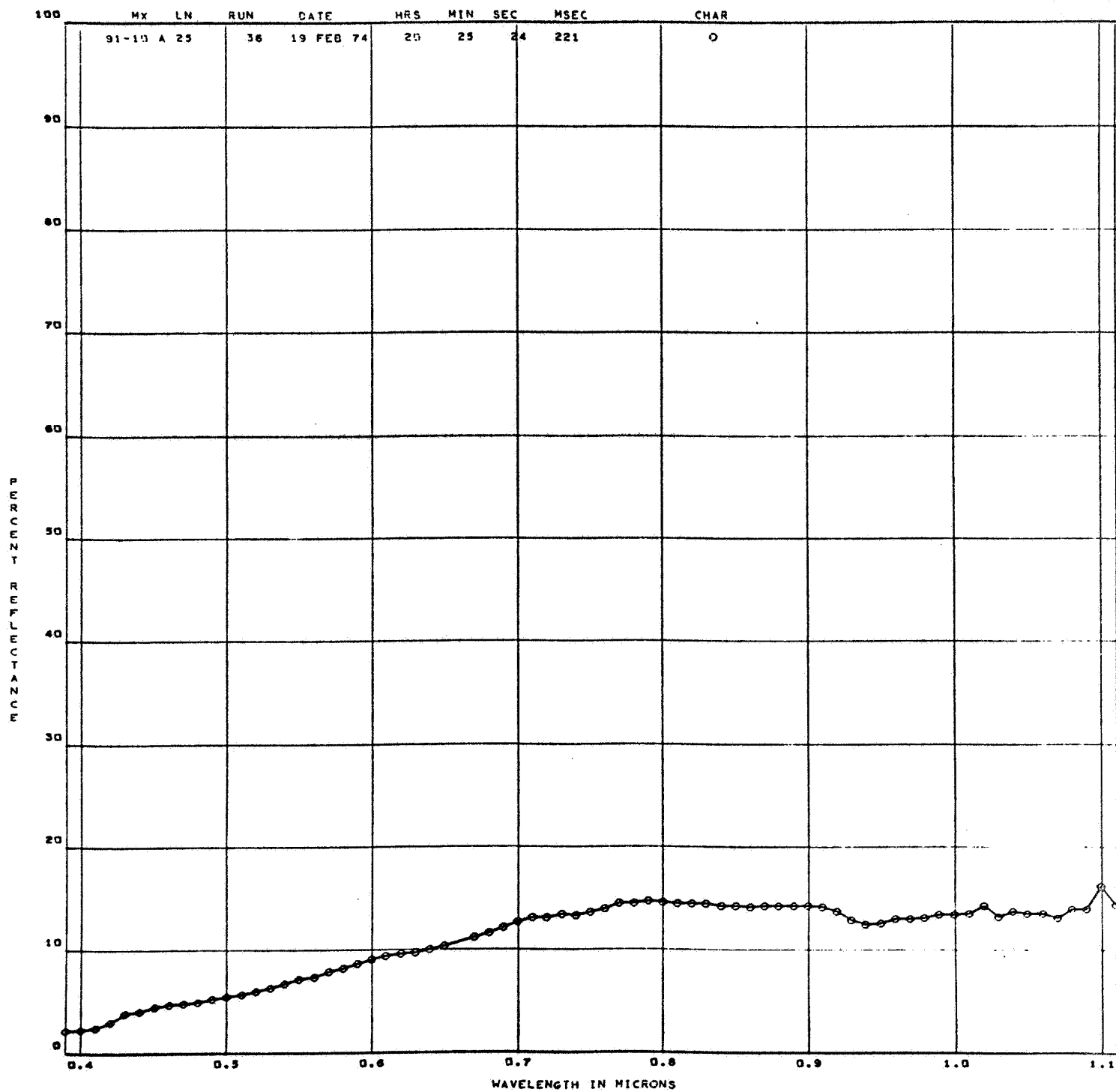
Circle represents spectrometer signature

PLOT NO. 25

ONIONS

SPECTROMETER SIGNATURE

U1108/SC4020  
0024 0000





PLOT NO. 26

POPPY - 1  
(Acquisition No. B-40-6-3)

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2rows on 40" beds with 12" spacing and 9" spacing in drill
Nov 9, 1973	Irrigated
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 9"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

PLOT NO. 26

POPPY-1  
(Acquisition No. B-40-6-3)

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	1	1	Moist 1" down	Wilted	Thinned Dec 17
Jan 3, 1974	1-1.5	4	Moist 1.5" down	Normal	-
Jan 10, 1974	2	12	Moist .5" down	Normal	-
Jan 14, 1974	3	22	Wet	Normal	-
Jan 25, 1974	4	15	Moist 3" down	Normal	Tens. = 11 Salt on rows - Jan 21, 1974
Jan 30, 1974	6	18	Moist 2" down	Normal	-
Feb 7, 1974	8	30	Dry	Normal	No weeds; tens. =50
Feb 14, 1974	11	35	Dry	Normal	-
Feb 22, 1974	13.5	40	-	Normal	Tens.= 80 on Feb 11, 84 Feb 13, 79 Feb 15 10 Feb 20

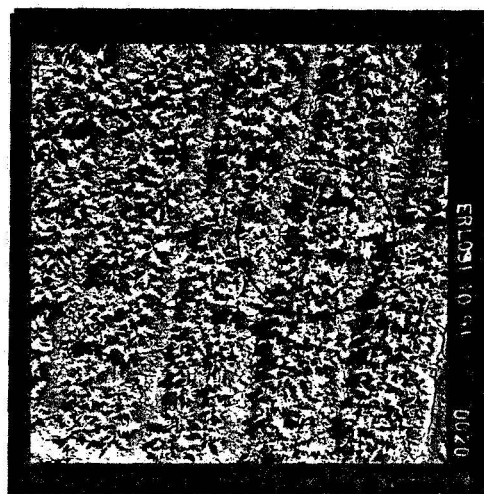
PLOT NO. 26

POPPY-1

FEBRUARY 19, 1974



GROUND LEVEL



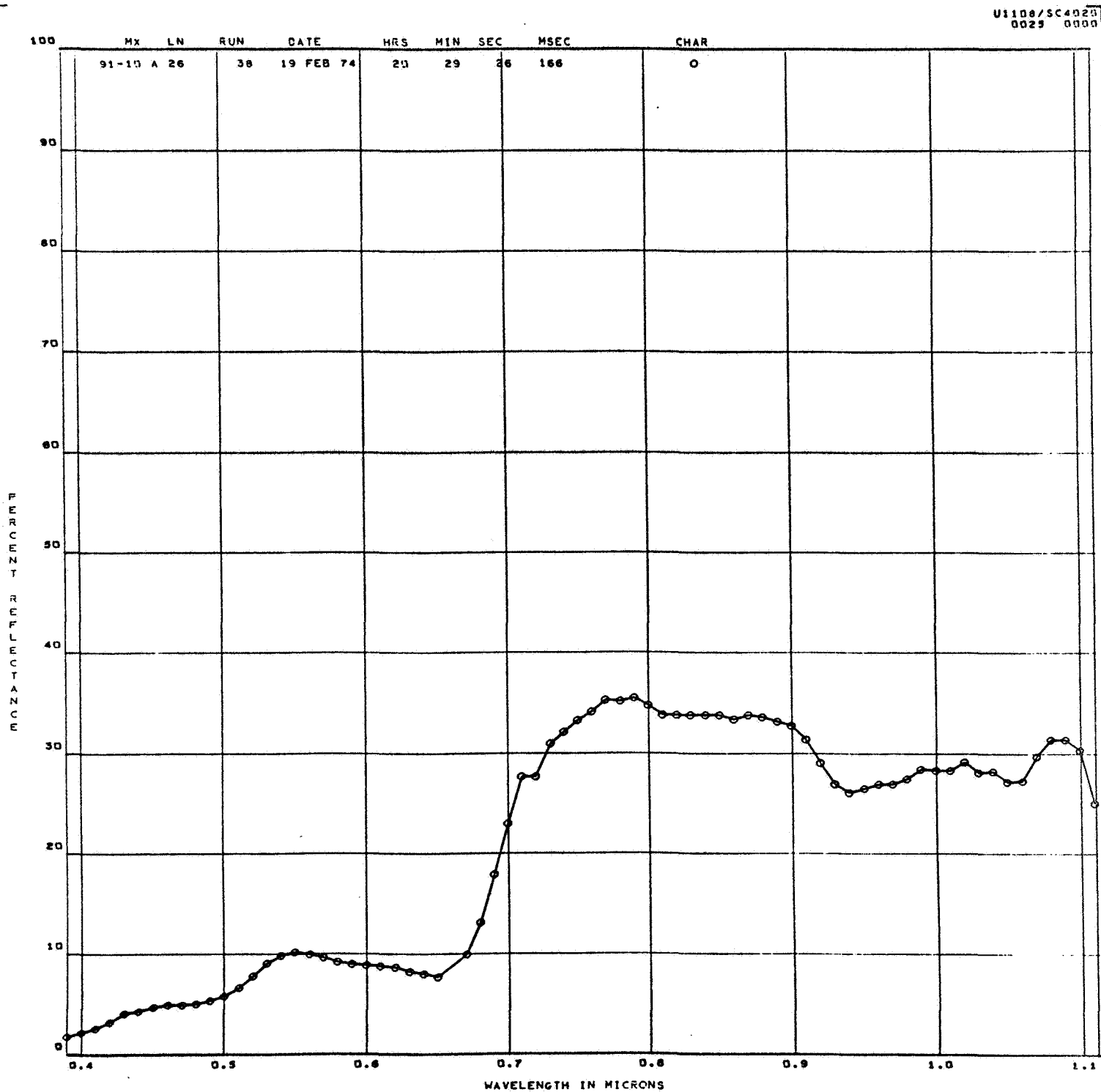
BORESIGHT

Circle represents spectrometer signature

PLOT NO. 26

POPPY-1

SPECTROMETER SIGNATURE



PLOT NO. 27

POPPY - 3  
(Acquisition No. 371923)

#### CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2 rows on 40" beds with 12" spacing and 9" spacing in drill
Nov 9, 1973	Irrigated
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 9"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

PLOT NO. 27

POPPY-3  
(Acquisition No. 371923)

# GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	1	1	Moist 1" down	Wilted	Thinned Dec 17
Jan 3, 1974	1	2	-	Normal	-
Jan 10, 1974	2	12	Moist .5" down	Normal	Few weeds
Jan 14, 1974	3	22	Wet	Normal	-
Jan 25, 1974	4	20	Moist 3" down	Normal	1% weeds
					Salt on rows -
					Jan 21, 1974
Jan 30, 1974	4	15	Moist 2" down	Normal	-
Feb 7, 1974	5	25	Dry	Normal	No weeds
Feb 14, 1974	6	25	Dry	Normal	-
Feb 22, 1974	8.5	35	-	Normal	-

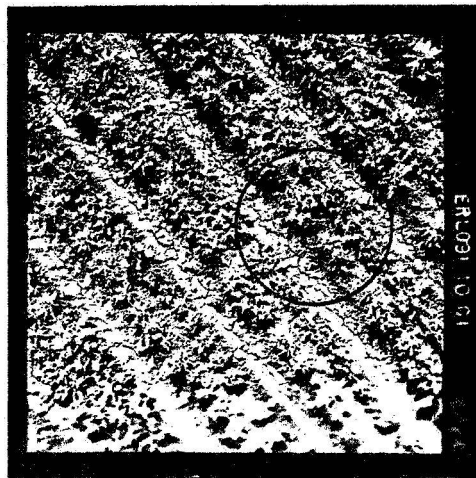
PLOT NO. 27

POPPY-3

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

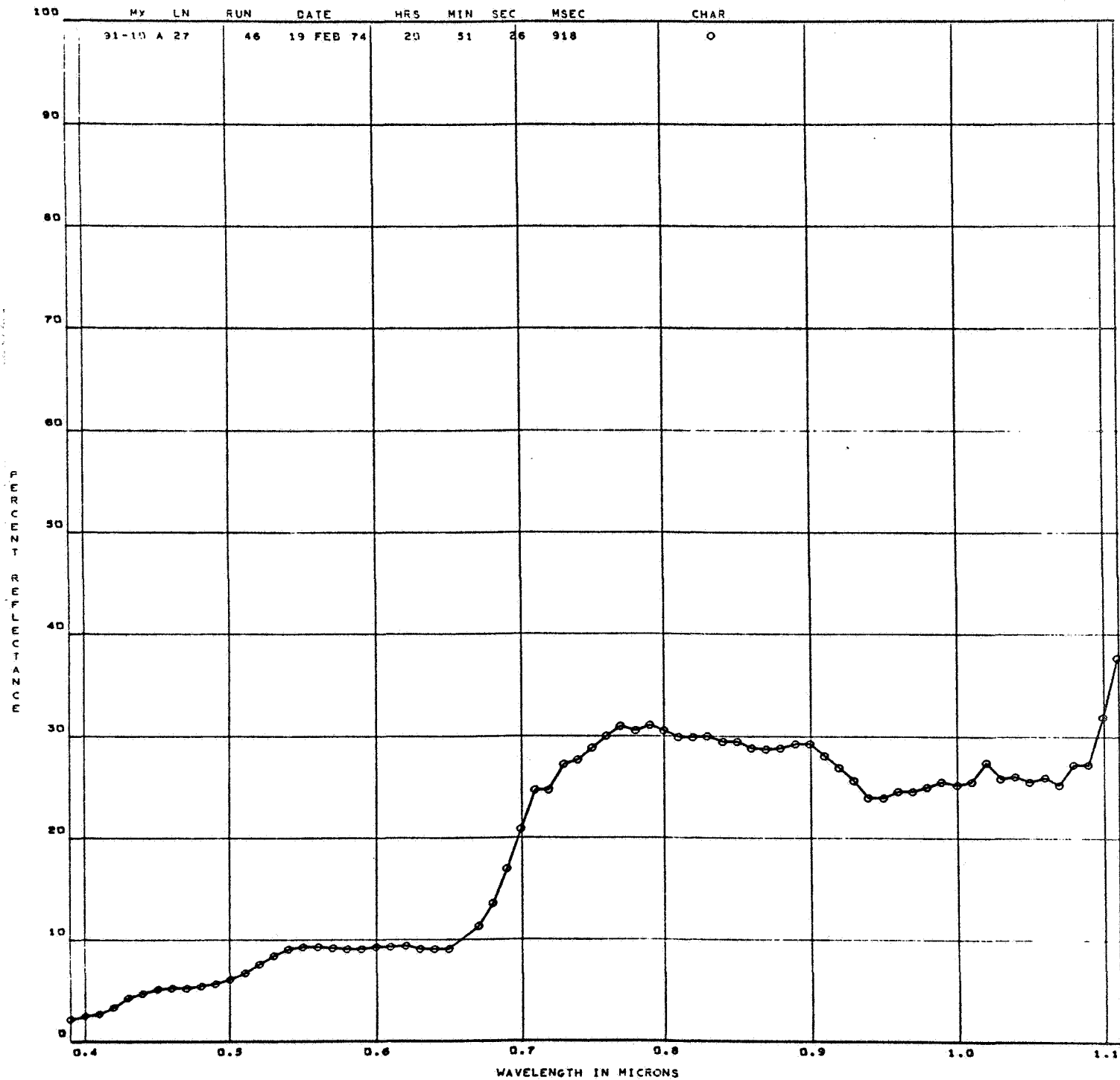
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PLOT NO. 27

POPPY-3

SPECTROMETER SIGNATURE

U1100/SC4020  
0026 0000





PLOT NO. 28

POPPY - 6  
(Acquisition No. B-40-6...3)

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2 rows on 40" beds with 12" spacing and 9" spacing in drill
Nov 9, 1973	Irrigated
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 9"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

PLOT NO. 28

POPPY-6  
(Acquisition No. B-40-6-3)

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	1	1	Moist 1" down	Wilted	Thinned Dec 17
Jan 3, 1974	1	2	Moist 1.5" down	Normal	-
Jan 10, 1974	2	10	Moist .5" down	Normal	-
Jan 14, 1974	2.5	20	Wet	Normal	-
Jan 25, 1974	4	15	Moist 3" down	Normal	Salt on rows - Jan 21, 1974
Jan 30, 1974	4	15	Moist 2" down	Normal	Sparse crop
Feb 7, 1974	6	15	Dry	Normal	Poor stand, no weeds
Feb 14, 1974	9	15	Dry	Normal	Sparse and spotty crops
Feb 22, 1974	12	-	-	-	Sparse crop

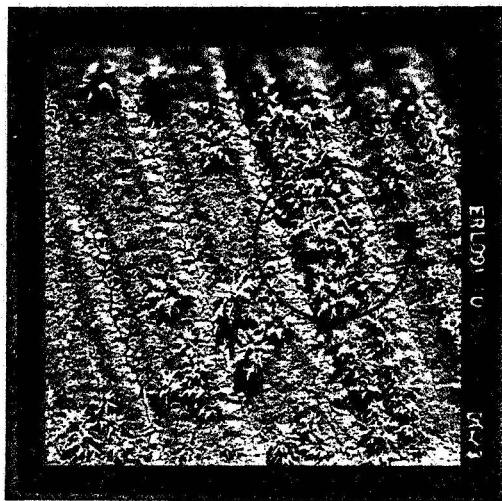
PLOT NO. 28

POPPY-6

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

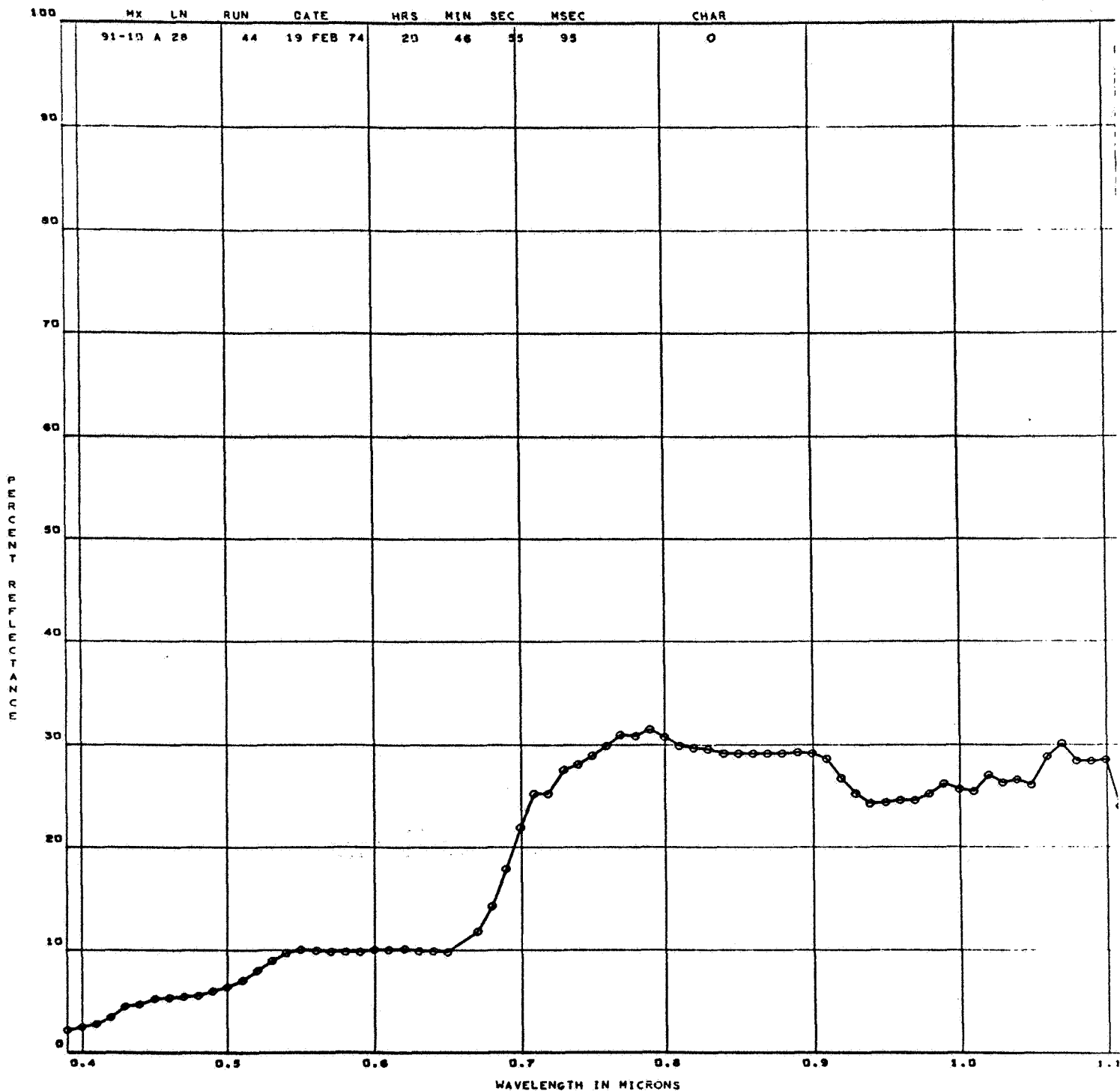
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PLOT NO. 28

POPPY-6

# SPECTROMETER SIGNATURE

U1108/5C402  
0027 000



## CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2 rows on 40" beds with 12" spacing and 24" spacing in drill
Nov 9, 1973	Irrigated
Nov 13, 1973	First emergence
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 24"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

PLOT NO. 34

CAULIFLOWER

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	1	1	Moist 1" down	Wilted	Thinned Dec 17
Jan 3, 1974	2	2	Moist 1.5" down	Normal	-
Jan 10, 1974	6	12	Moist .5" down	Normal	-
Jan 14, 1974	6.5	15	Wet	Normal	-
Jan 25, 1974	8	20	Moist 3" down	Normal -	2% weeds Salt on rows - Jan 21, 1974
Jan 30, 1974	9	20	Moist 2" down	Normal	-
Feb 7, 1974	12	30	Dry	Normal	No weeds
Feb 14, 1974	14	31	Dry	Normal	-
Feb 22, 1974	14	31	-	Normal	-

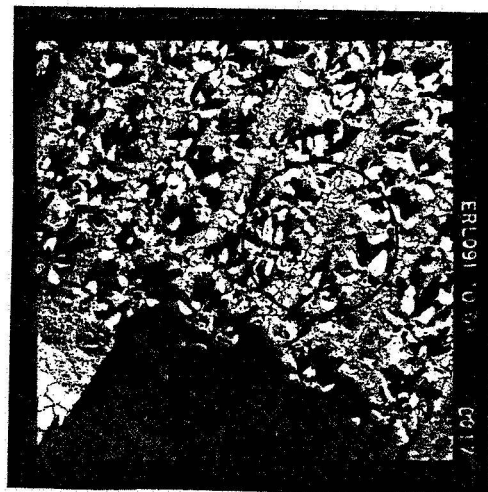
PLOT NO. 34

CAULIFLOWER

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

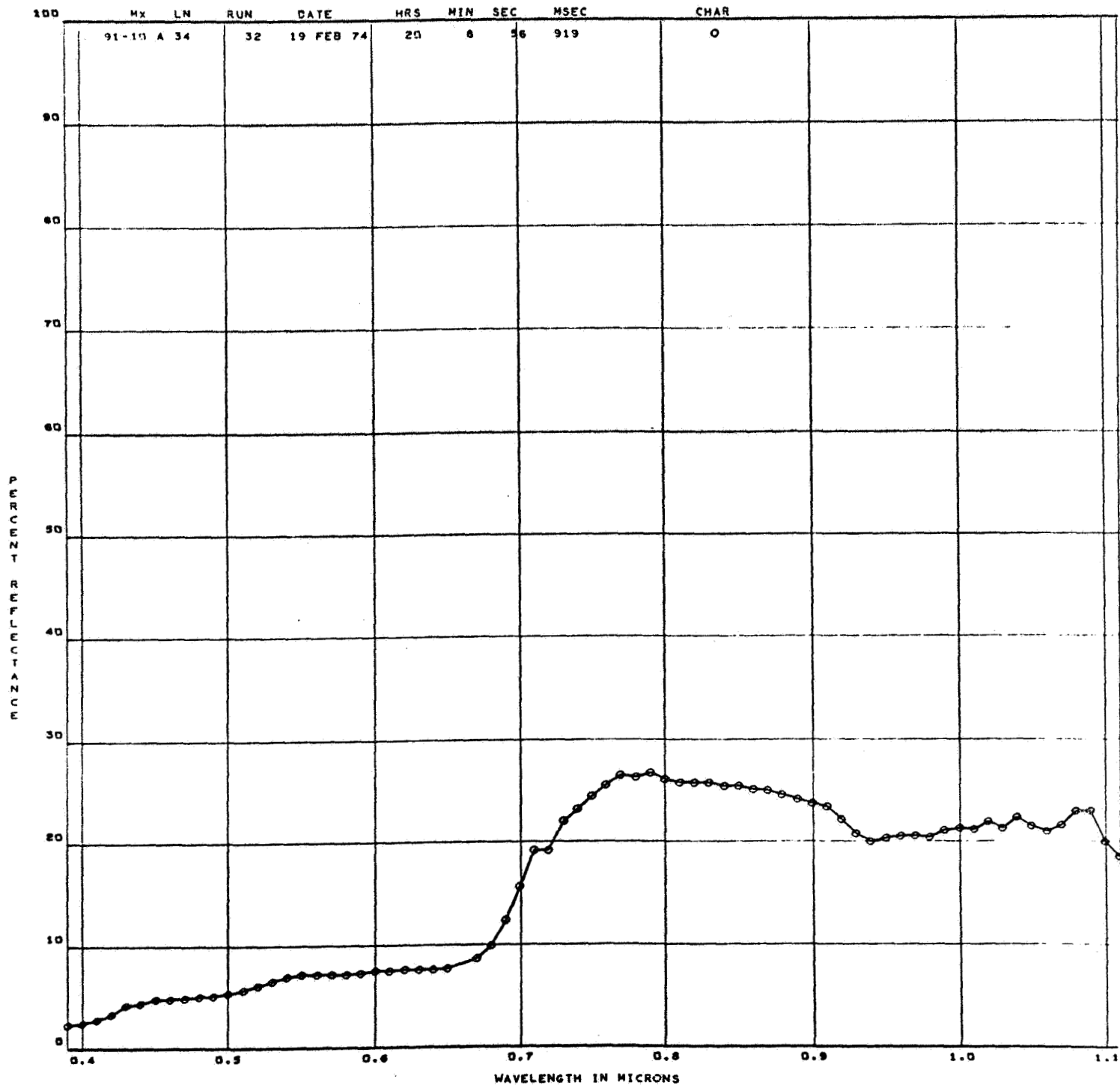
Circle represents spectrometer signature

PLOT NO. 34

CAULIFLOWER

SPECTROMETER SIGNATURE

U1108/SC4020  
0028 0000





PLOT NO. 35

CARROT

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 4 rows on 40" beds with 4-8-4 " spacing
Nov 9, 1973	Irrigated
Nov 21, 1973	Irrigated
Nov 26, 1973	First emergence
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated - Sprayed with Lorax
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

PLOT NO. 35

CARROT

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	1	1	Moist 1" down	Sprouts emerged	-
Jan 3, 1974	-	-	Moist 1" down	-	-
Jan 10, 1974	2	30	Moist .5" down	Normal	10% Weeds
Jan 14, 1974	2	20	Wet	Normal	7% Weeds
Jan 25, 1974	4	33	Moist 3" down	Normal	3% weeds Tens. = 8 Salt on rows - Jan 21, 1974
Jan 30, 1974	4	30	Moist 2" down	Normal	-
Feb 7, 1974	4	33	Dry	Normal	No weeds, tens.=50
Feb 14, 1974	5	33	Dry	Normal	-
Feb 22, 1974	5	33	-	Normal	Tens.= 59 on Feb 11 62 Feb 13, 79 Feb 15 10 Feb 20

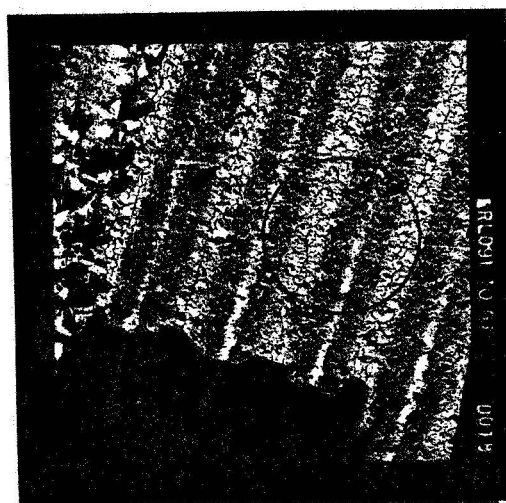
PLOT NO. 35

CARROT

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

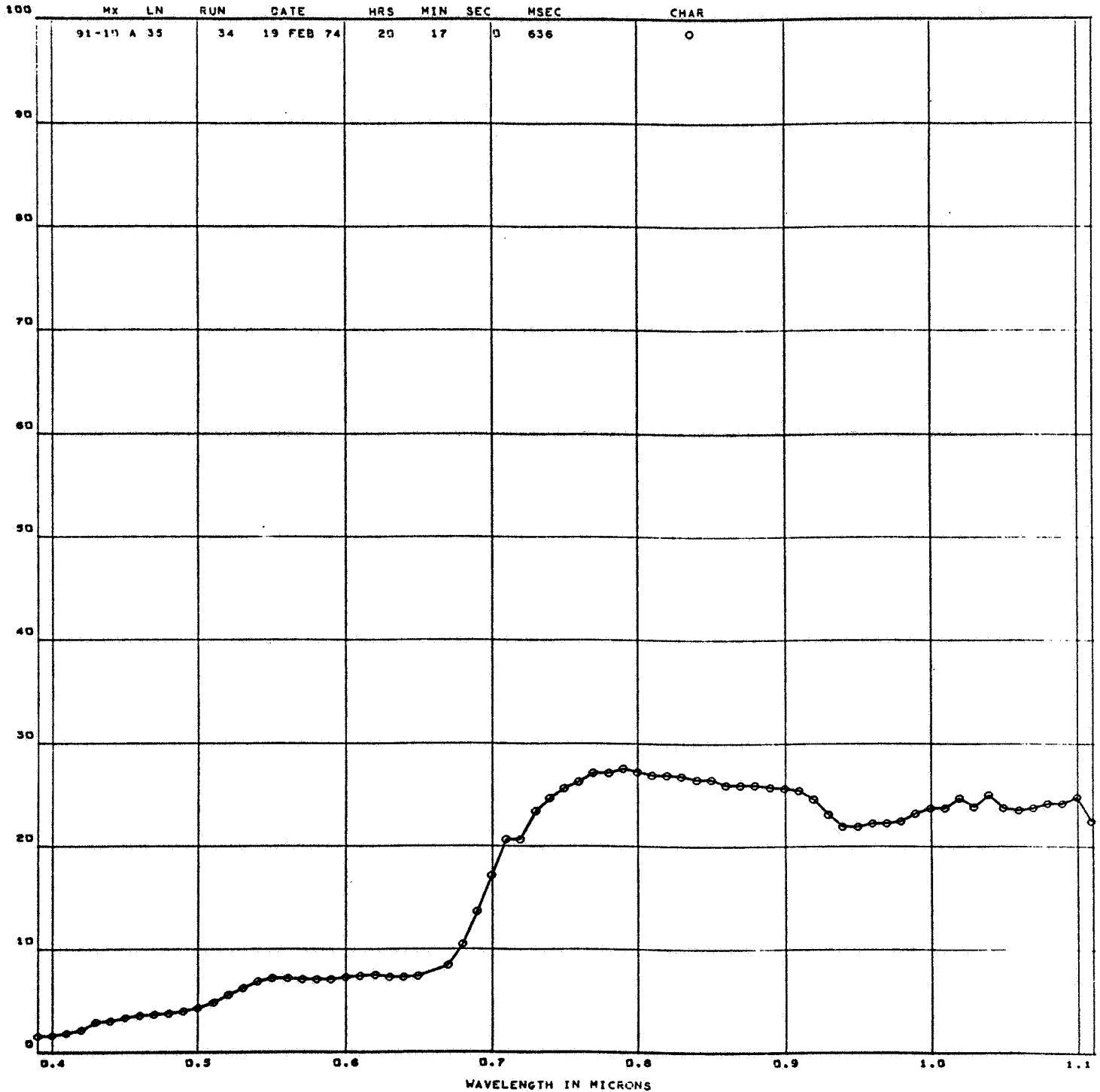
Circle represents spectrometer signature

PLOT NO. 35

CARROT

SPECTROMETER SIGNATURE

U1108/SC4020  
0029 0000



## CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Dec 4, 1973	Planted 2 rows on 40" beds with 12" spacing
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 26, 1973	First emergence
Jan 7, 1974	Poor stand
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Transplanted for proper stand - Irrigated
Jan 28, 1974	Hoeed weeds
Jan 29, 1974	Disced fallow portion
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

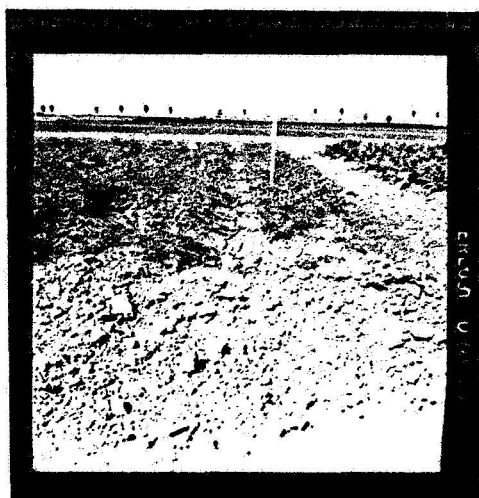
## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	-	-	Moist 1" down	-	Not emerged
Jan 3, 1974	1	1	Moist 1.5" down	Normal	-
Jan 10, 1974	2.5	3	Moist .5" down	Normal	Poor stand
Jan 14, 1974	4	6	Wet	Normal	Transplanted for good stand
Jan 25, 1974	6	8	Moist 3" down	Normal	Salt on rows - Jan 21, 1974
Jan 30, 1974	6	7	Moist 2" down	Normal -	-
Feb 7, 1974	7	20	Dry	Normal	No weeds
Feb 14, 1974	9	20	Dry	Normal	Poor stand
Feb 22, 1974	11	21	-	Normal	Small white - blossoms

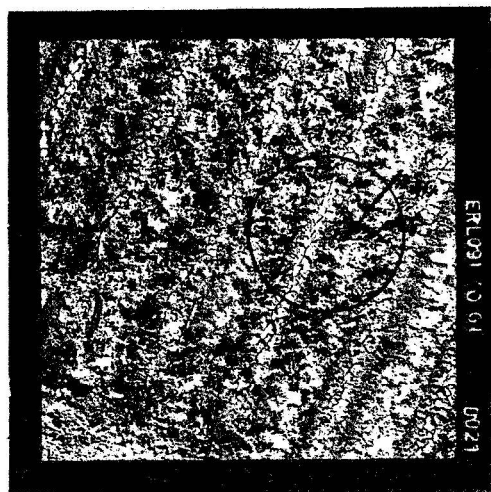
PLOT NO. 36

CHICK PEAS

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

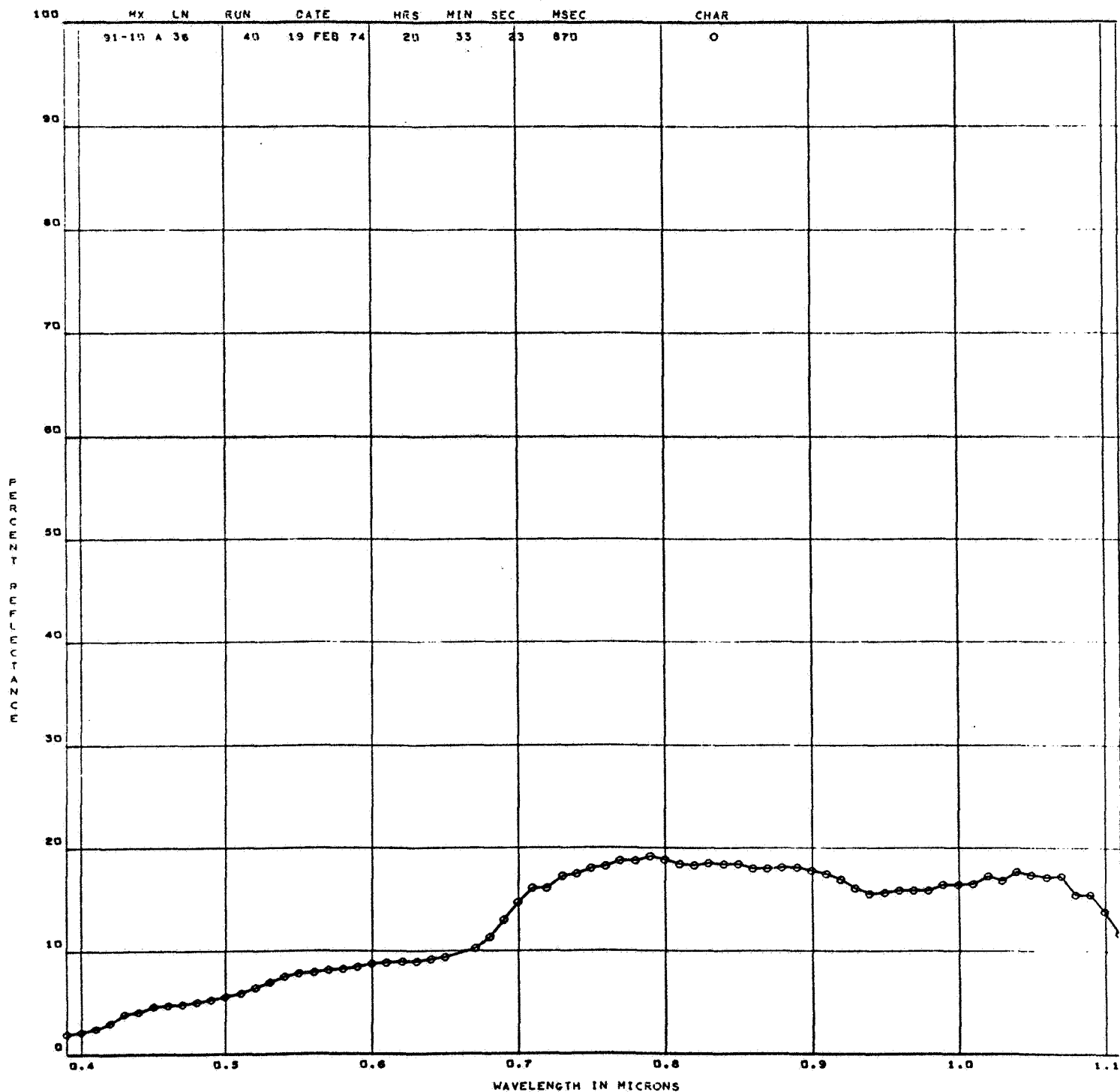
Circle represents spectrometer signature

PLOT NO. 36

CHICK PEAS

SPECTROMETER SIGNATURE

U1108/SC4020  
0030 0000





PLOT NO. 37

POPPY - 2  
(Acquisition No. M-89)

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted rows on 40" beds with 12" spacing and 9" spacing in drill
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 9"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

PLOT NO. 37

POPPY-2  
(Acquisition No. M-39)

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	1	1	Moist 1" down	Wilted	Thinned Dec 19
Jan 3, 1974	1.5	2	Moist 1.5" down	Normal	-
Jan 10, 1974	2	10	Moist .5" down	Normal	-
Jan 14, 1974	3	22	Wet	Normal	-
Jan 25, 1974	4	15	Moist 3" down	Normal	5% weeds
					Salt on rows -
					Jan 21, 1974
Jan 30, 1974	6	15	Moist 2" down	Normal	-
Feb 7, 1974	7	30	Dry	Normal	No weeds
Feb 14, 1974	9	33	Dry	Normal	-
Feb 22, 1974	10	46	-	Normal	-

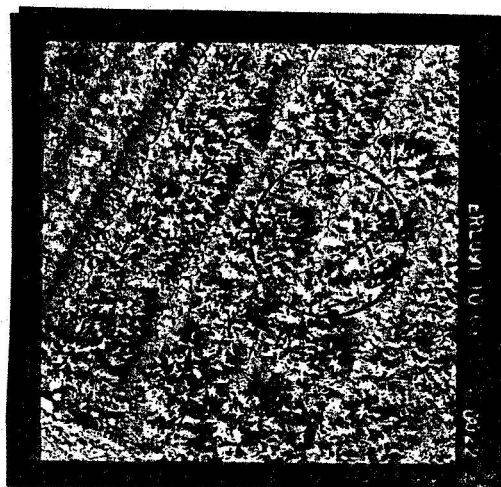
PLOT NO. 37

POPPY-2

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

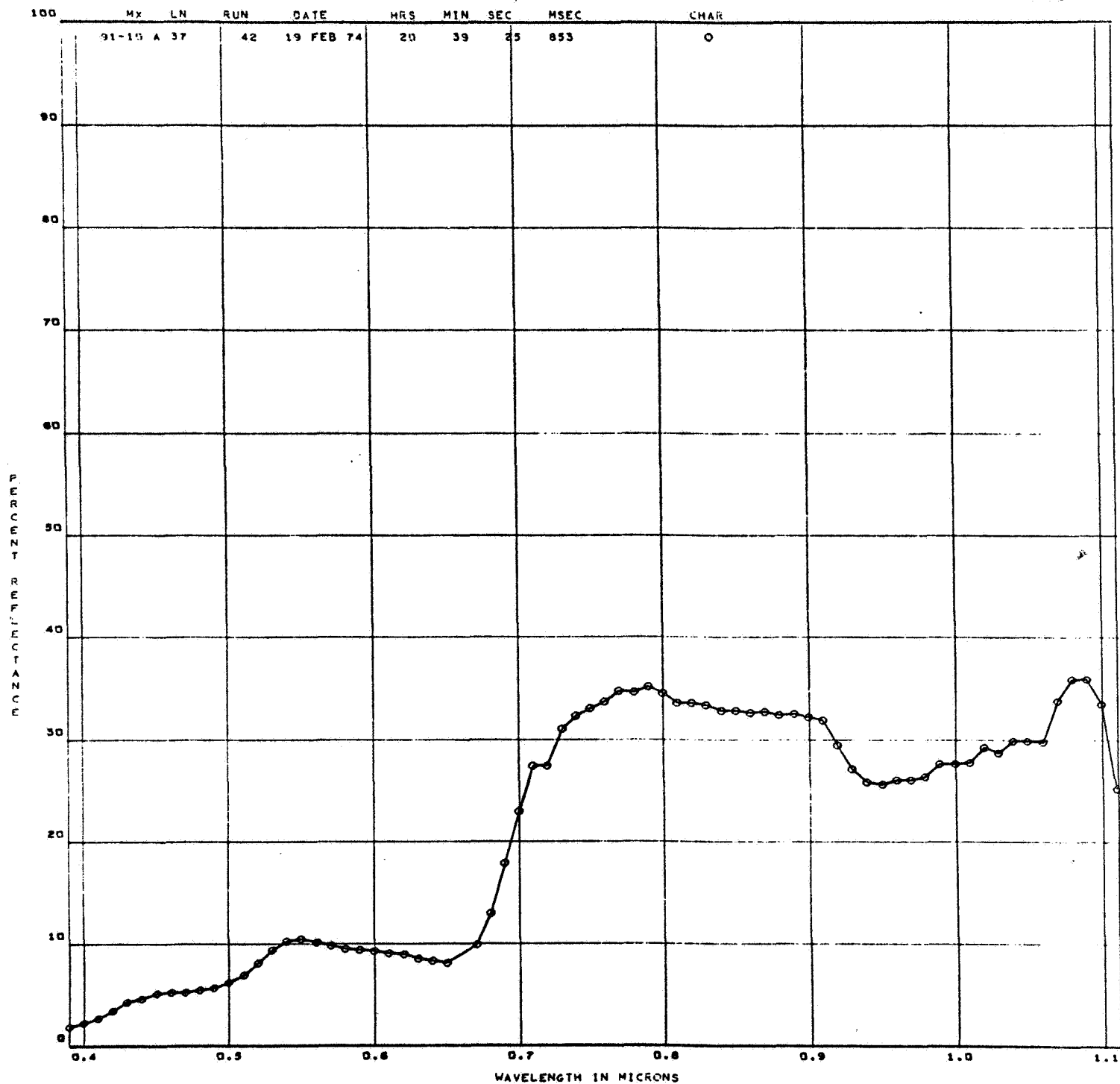
Circle represents spectrometer signature

PLOT NO. 37

POPPY-2

# SPECTROMETER SIGNATURE

U1100/SC4020  
0031 0000



PLOT NO. 38

POPPY -- 4  
(Mixture of 1, 2, 3)

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 7, 1973	Planted 2 rows on 40" beds with 12" spacing and 9" spacing in drill
Nov 9, 1973	Irrigated
Nov 13, 1973	First emergence
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned to 9"
Dec 26, 1973	Cultivated
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

PLOT NO. 38

POPPY-4  
(Mixture 1,2,3 )

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	1	1	Moist 1" down	Wilted	Thinned Dec 17
Jan 3, 1974	1.5	3	Moist 1.5" down	Normal	-
Jan 10, 1974	2	10	Moist .5" down	Normal	-
Jan 14, 1974	2.5	20	Wet	Wet	-
Jan 25, 1974	4	20	Moist 3" down	Normal	2% weeds Salt on rows - Jan 21, 1974
Jan 30, 1974	6	18	Moist 2" down	Normal	-
Feb 7, 1974	7	30	Dry	Normal	No weeds
Feb 14, 1974	10	33	Dry	Normal	-
Feb 22, 1974	11	46	-	Normal	-

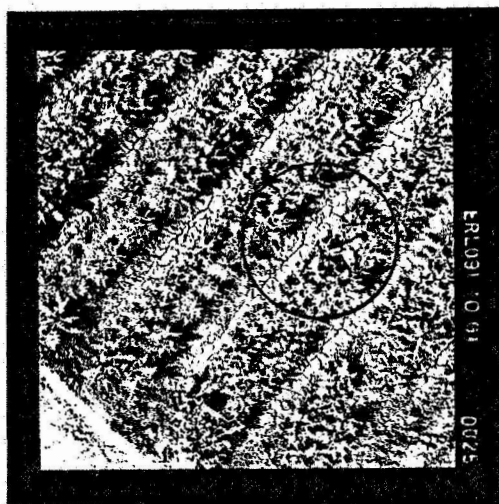
PLOT NO. 38

POPPY-4

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

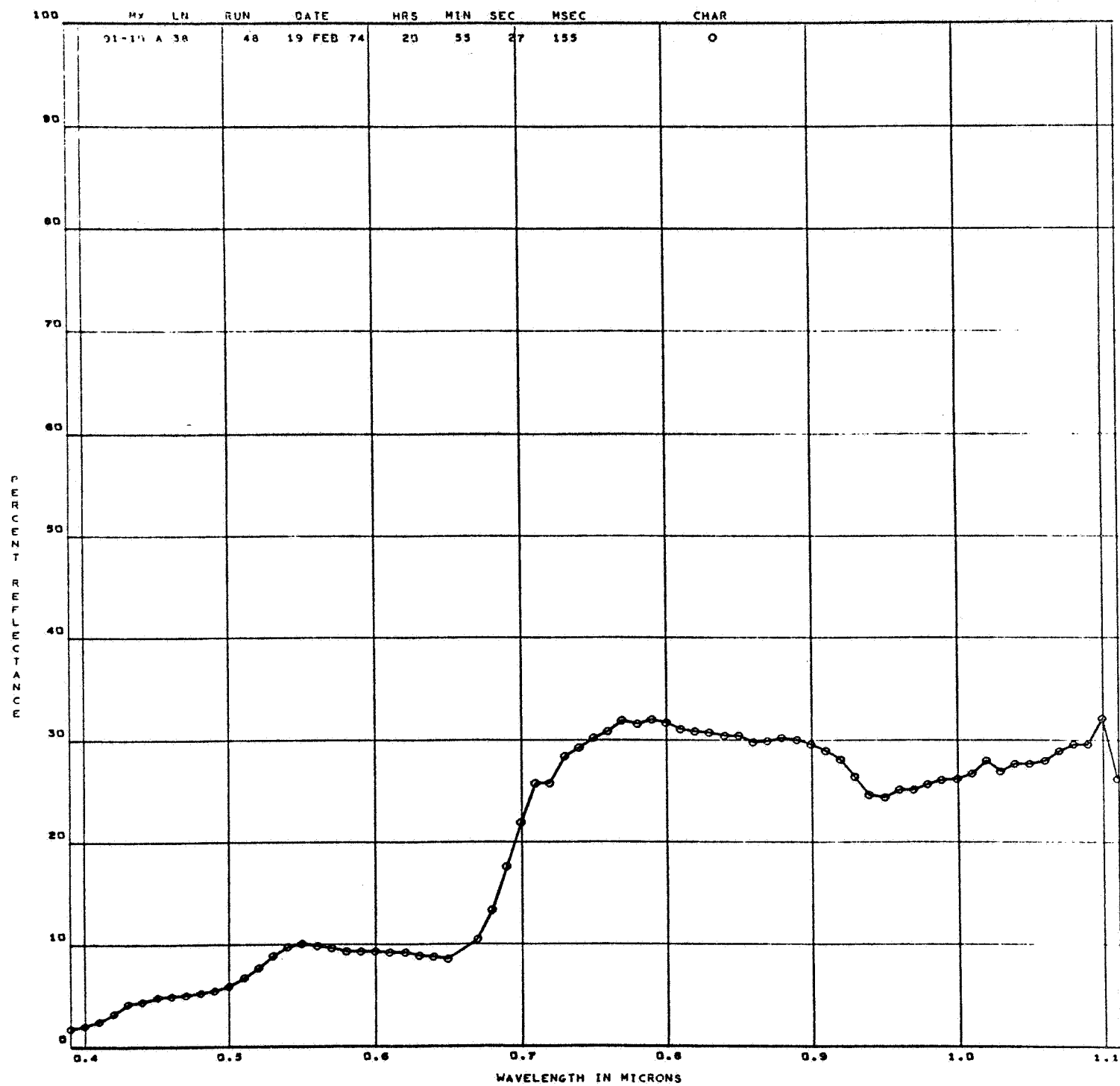
Circle represents spectrometer signature

PLOT NO. 38

POPPY-4

SPECTROMETER SIGNATURE

U1108/SC4020  
0032 0000





PLOT NO. 39

BARE GROUND  
(DRY)

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac
Nov 9, 1973	Irrigated
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 26, 1973	Cultivated
Jan 15, 1974	Irrigated
Jan 28, 1974	Hoed weeds
Jan 29, 1974	Disced fallow portion
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

PLOT NO. 39

BARE GROUND  
(DRY)

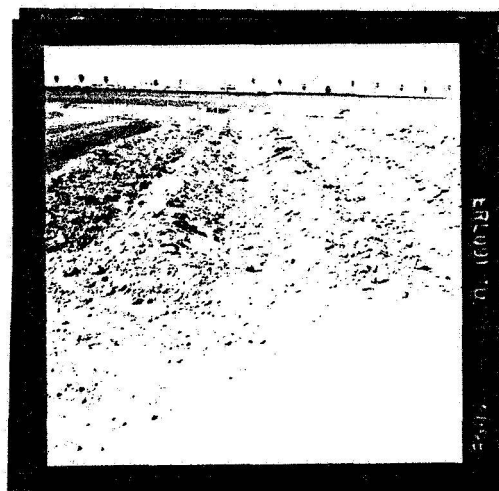
## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Dec 18, 1973	-	-	Moist 1" down	-	-
Jan 3, 1974	-	-	Dry	-	No weeds
Jan 10, 1974	-	0	Moist .5" down	-	-
Jan 14, 1974	-	0	Dry	-	Not irrigated or cultivated
Jan 25, 1974	-	0	Moist 3" down	-	No weeds Salt on rows - Jan 21, 1974
Jan 30, 1974	-	-	Dry	-	-
Feb 7, 1974	-	-	-	-	No weeds
Feb 14, 1974	-	-	Dry	-	-
Feb 22, 1974	-	0	-	-	-

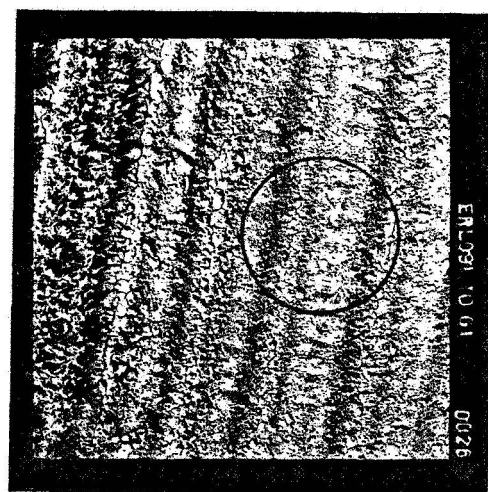
PLOT NO. 39

BARE GROUND  
(DRY)

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

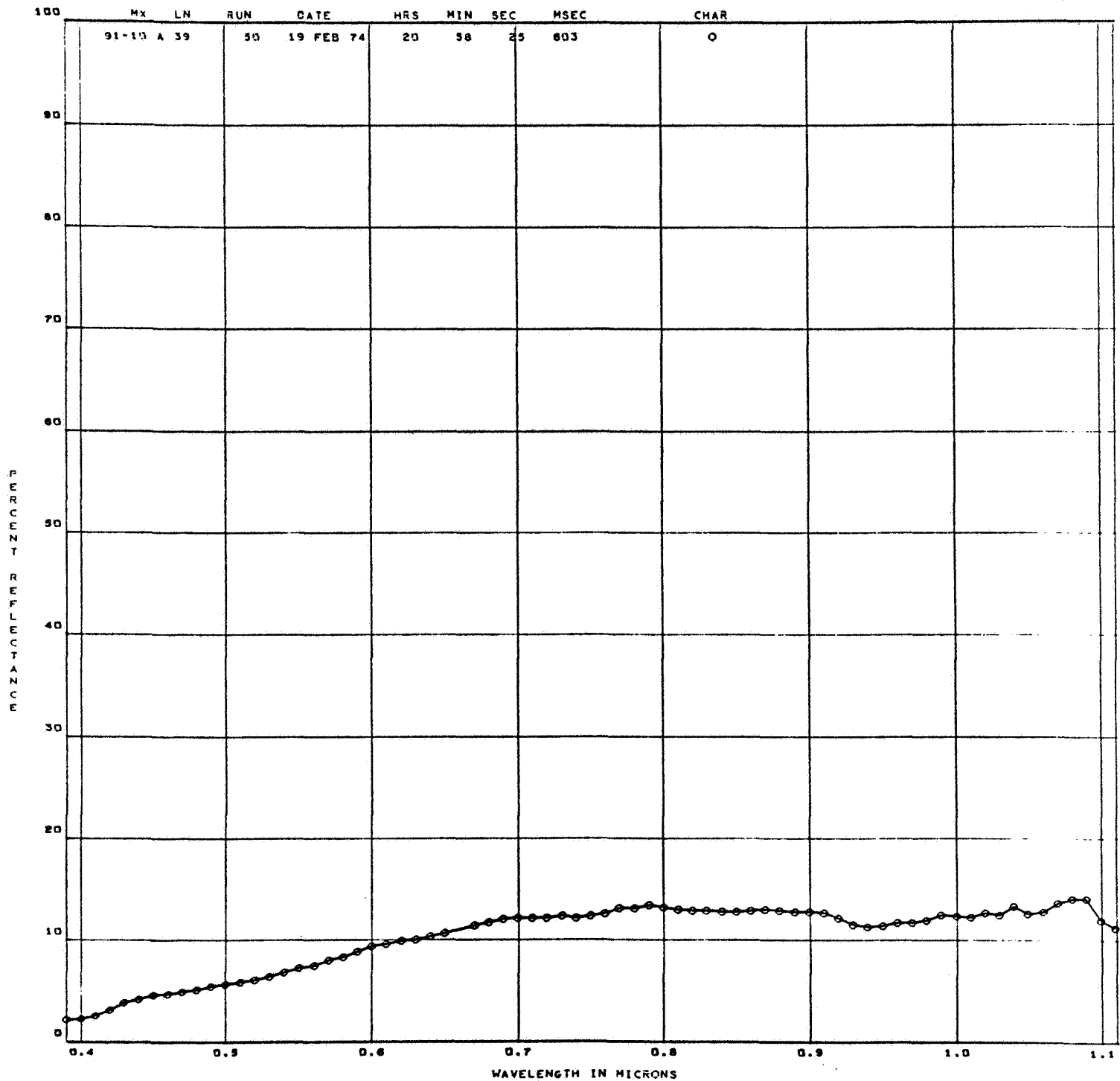
Circle represents spectrometer signature

PLOT NO. 39

BARE GROUND  
(DRY)

SPECTROMETER SIGNATURE

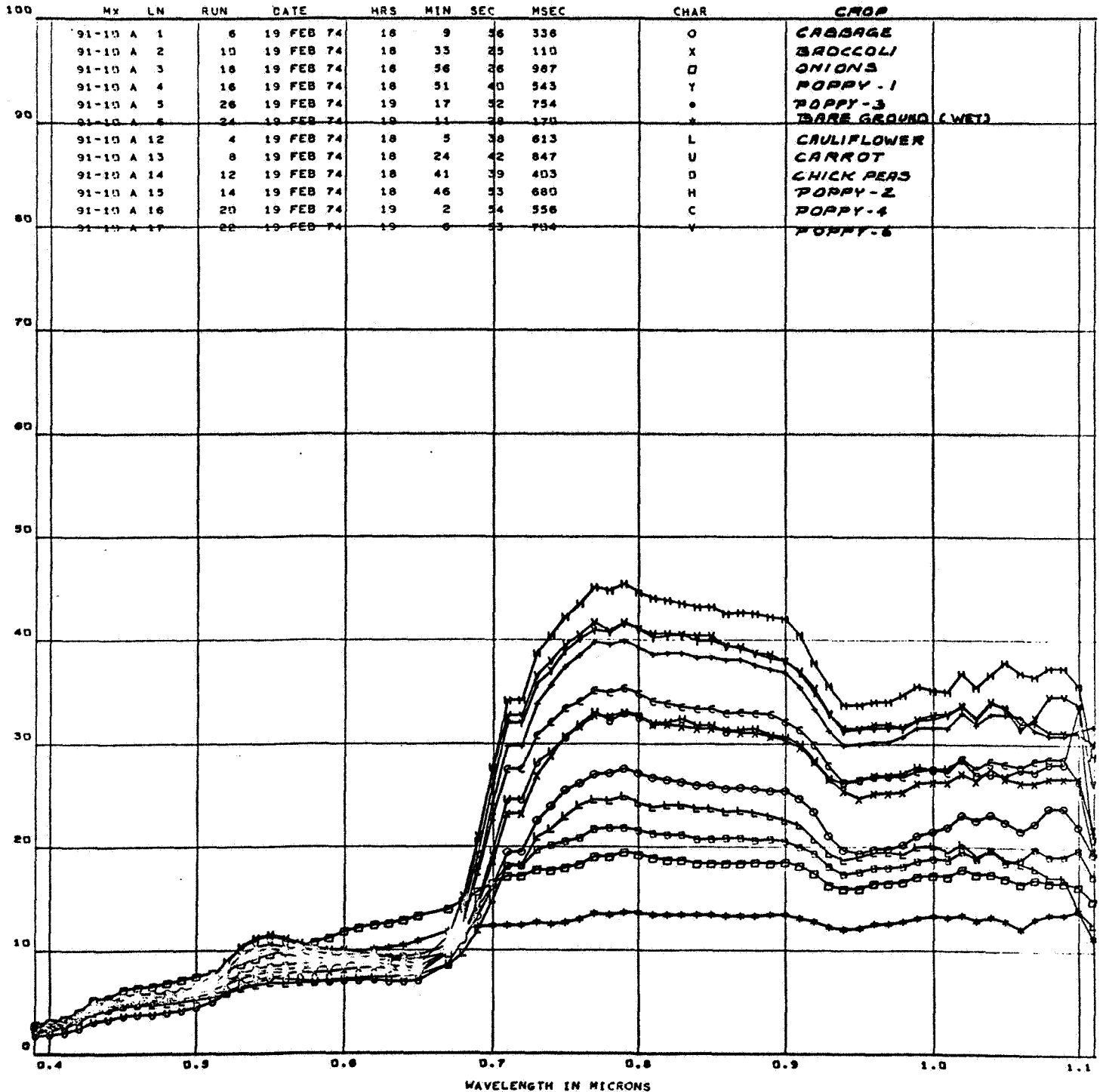
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# MULTIPLE SPECTROMETER CURVES

February 19, 1974

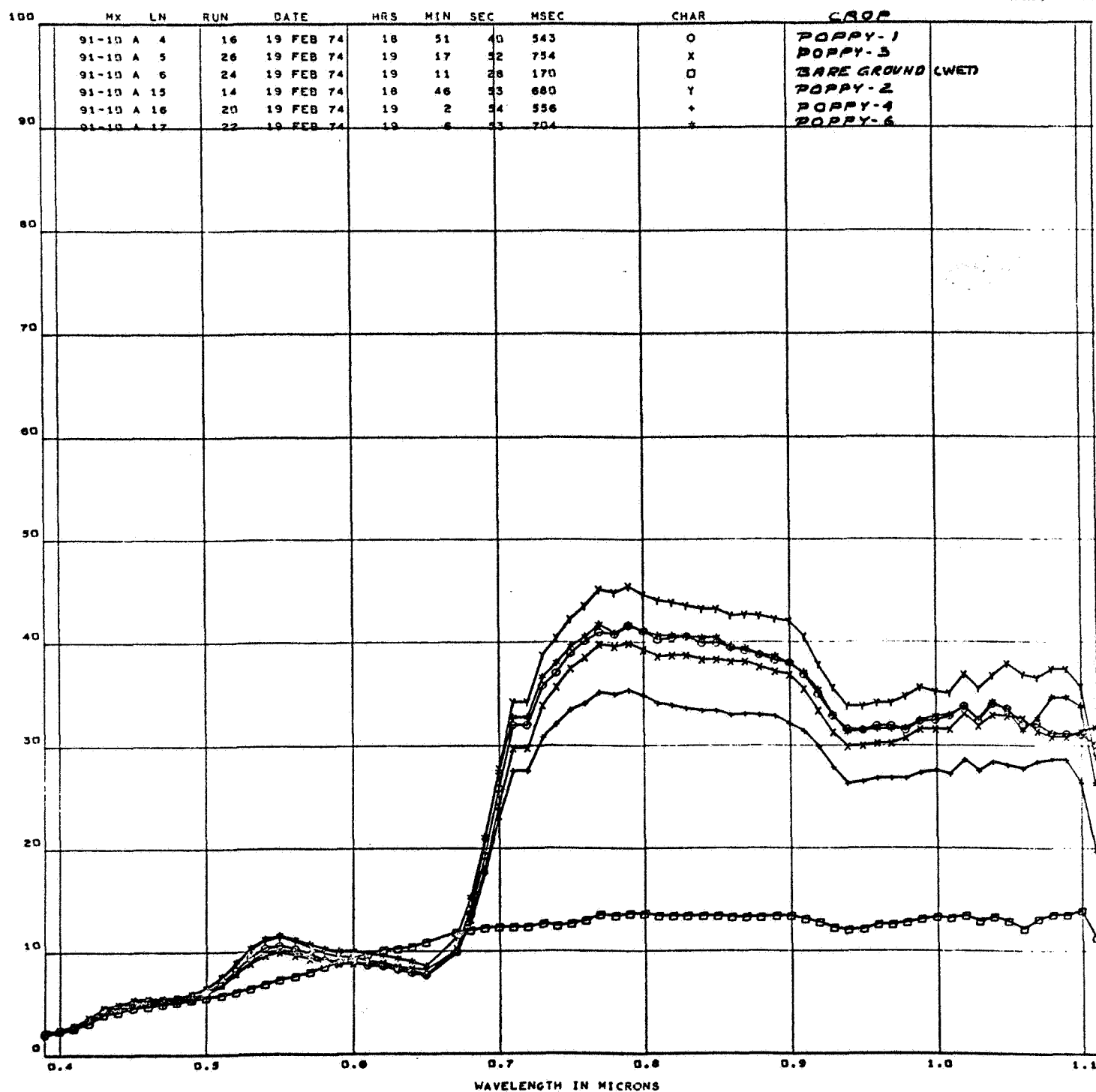
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# MULTIPLE SPECTROMETER CURVES

February 19, 1974

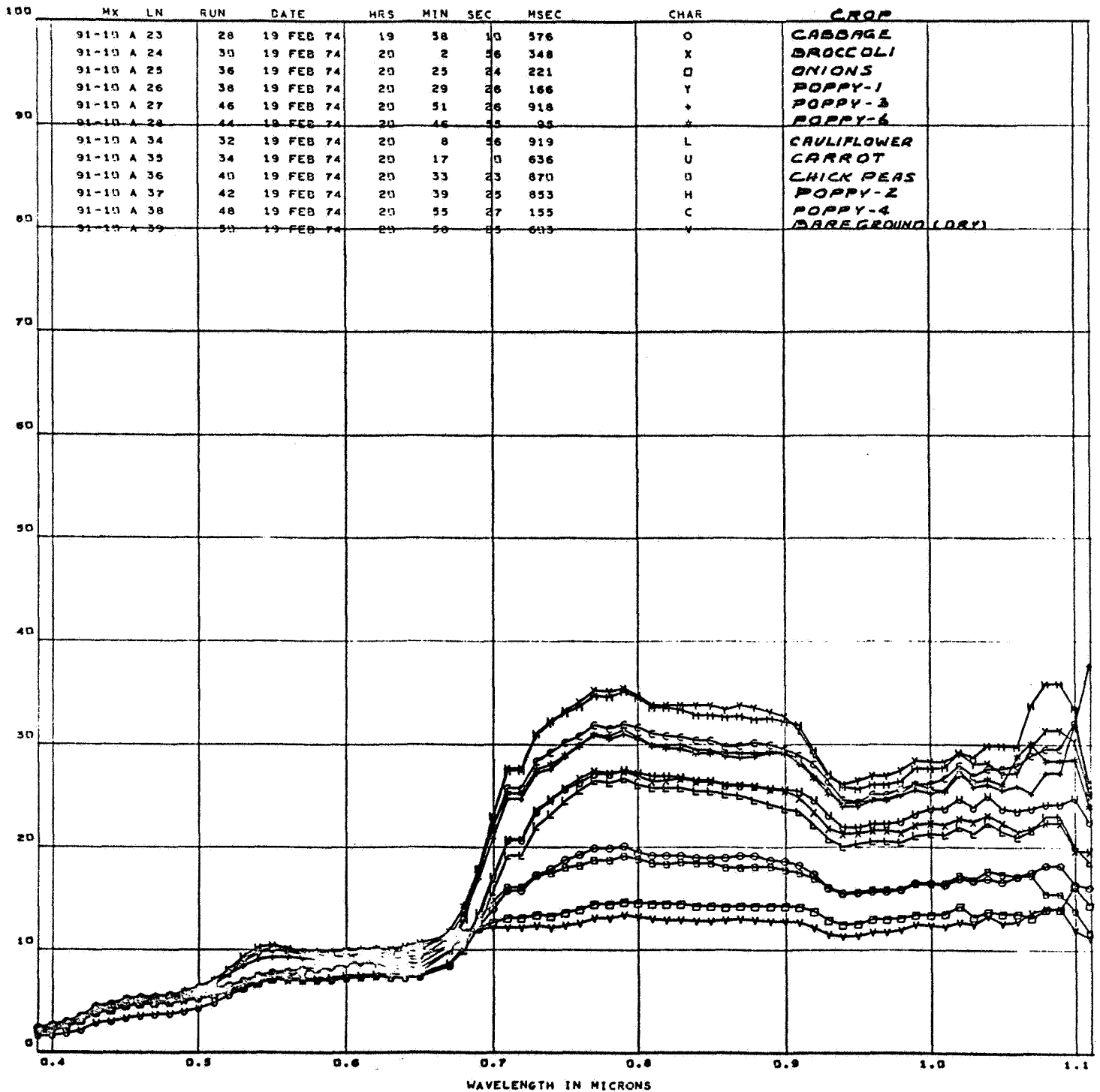
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# MULTIPLE SPECTROMETER CURVES

February 19, 1974

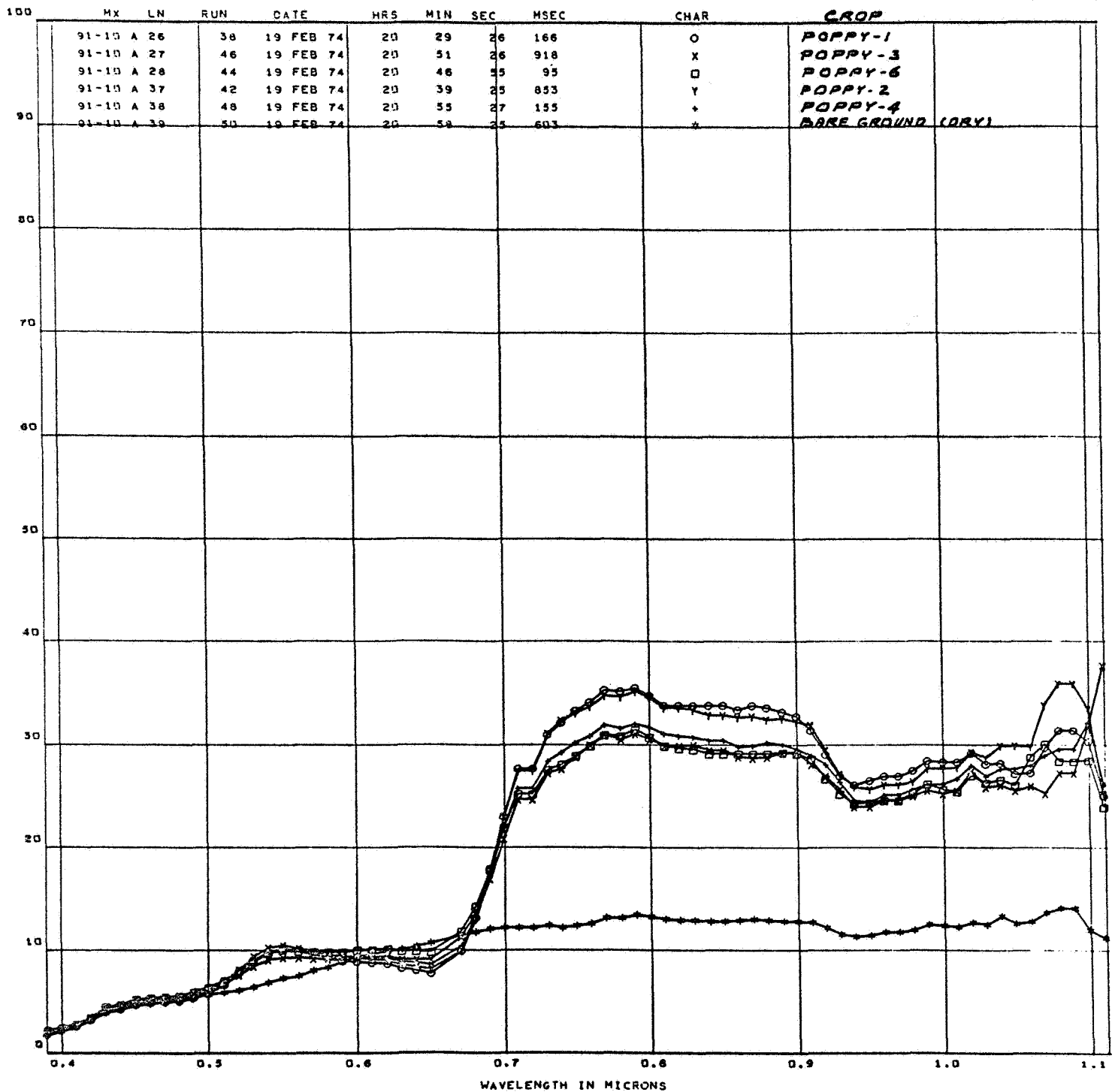
U1108/SC4020  
0035 0000



# MULTIPLE SPECTROMETER CURVES

February 19, 1974

U1108/SC4320  
0037 0000





PLOT NO. 51

POPPY - 1  
(Acquisition No. B-40-6-3)

CROP HISTORY

Nov 6, 1973	Fertilized with 50lbs N/Ac
Nov 11, 1973	Irrigated
Nov 13, 1973	First emergence
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 19, 1973	Thinned
Dec 27, 1973	Cultivated
Jan 9, 1974	Hoed weeds
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 14, 1974	Thinned double plants - Irrigated
Jan 28, 1974	Hoed weeds
Jan 31, 1974	6 cm test plants N - S too close, E - W 13", height 7" 12 cm N - S too close, E - W 11" height 4.5"
Feb 15, 1974	Irrigated

PLOT NO. 51

 POPPY-1  
 (Acquisition No. B-40-6-3)  
 ( 6 cm spacing)

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Jan 3, 1974	1	3	Moist 1.5" down	Normal	-
Jan 10, 1974	2	-	Moist .5" down	Normal	-
Jan 14, 1974	3	15	Wet	Normal	-
Jan 25, 1974	5	25	Moist 1" down	Normal	No weeds Salt on rows - Jan 21, 1974
Jan 30, 1974	7	33	Moist 2" down	Normal	-
Feb 7, 1974	11	33	Dry	Normal	No weeds
Feb 14, 1974	12	38	Dry	Normal	-
Feb 22, 1974	16	51	-	Normal	-

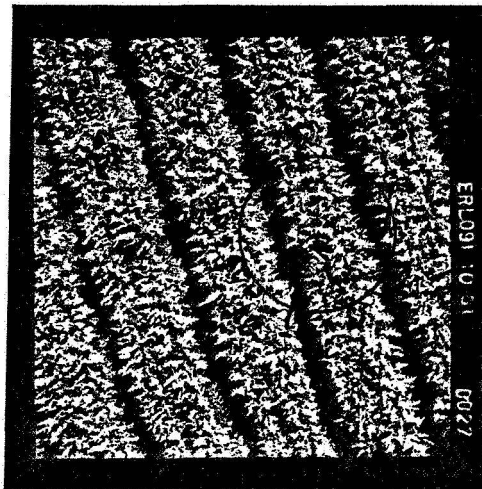
PLOT NO. 51

POPPY-1

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

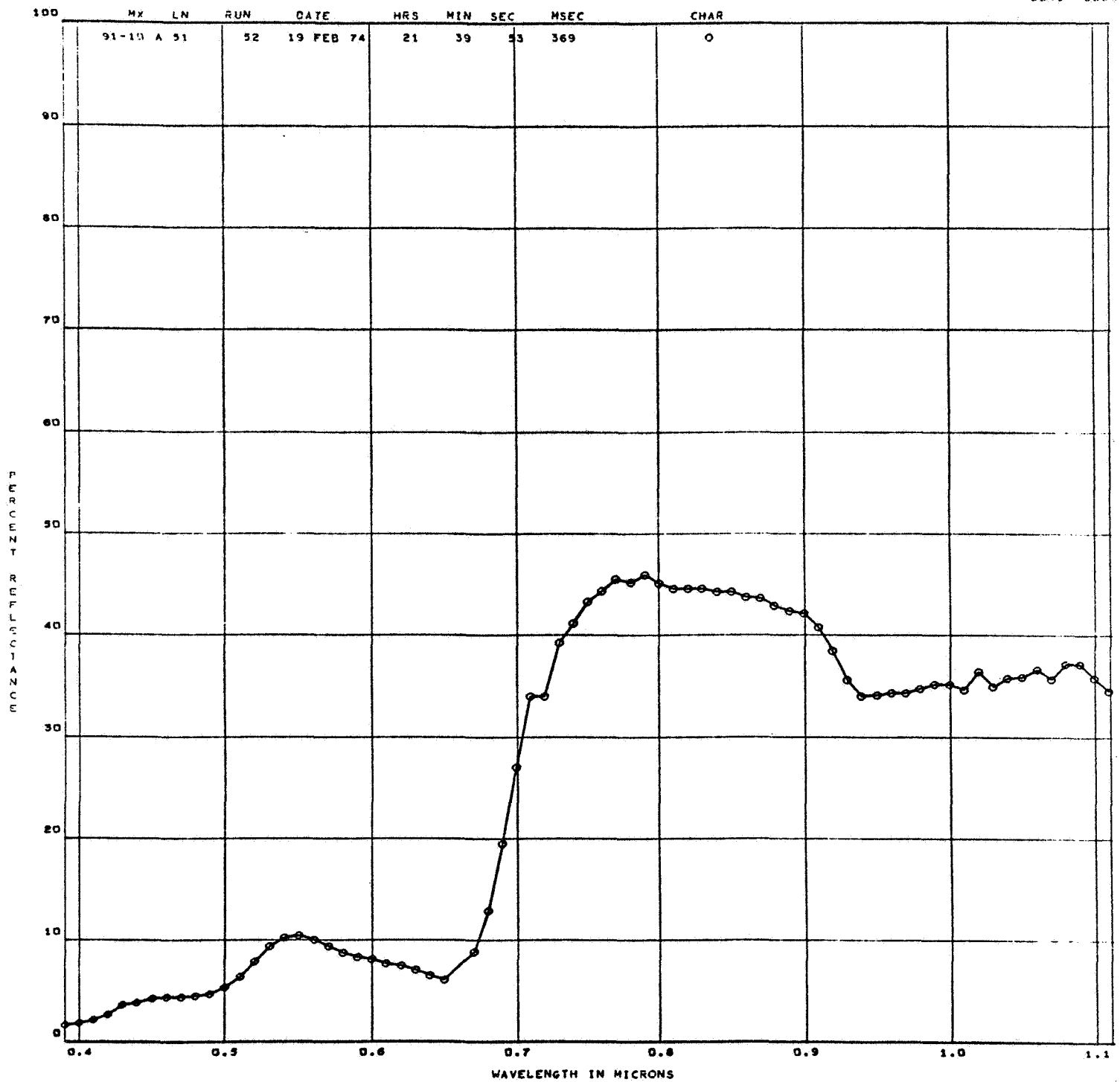
Circle represents spectrometer signature

PLOT NO. 51

POPPY-1

SPECTROMETER SIGNATURE

U1108/SC4027  
0049 0000



## CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac - Planted
Nov 11, 1973	Irrigated
Nov 13, 1973	First emergence
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 17, 1973	Thinned
Dec 27, 1973	Cultivated
Jan 9, 1974	Hoed weeds
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 14, 1974	Thinned double plants - Irrigated
Jan 28, 1974	Hoed weeds
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

PLOT NO. 52

 POPPY - 2  
 (Acquisition No. M-89)  
 (18 cm spacing )

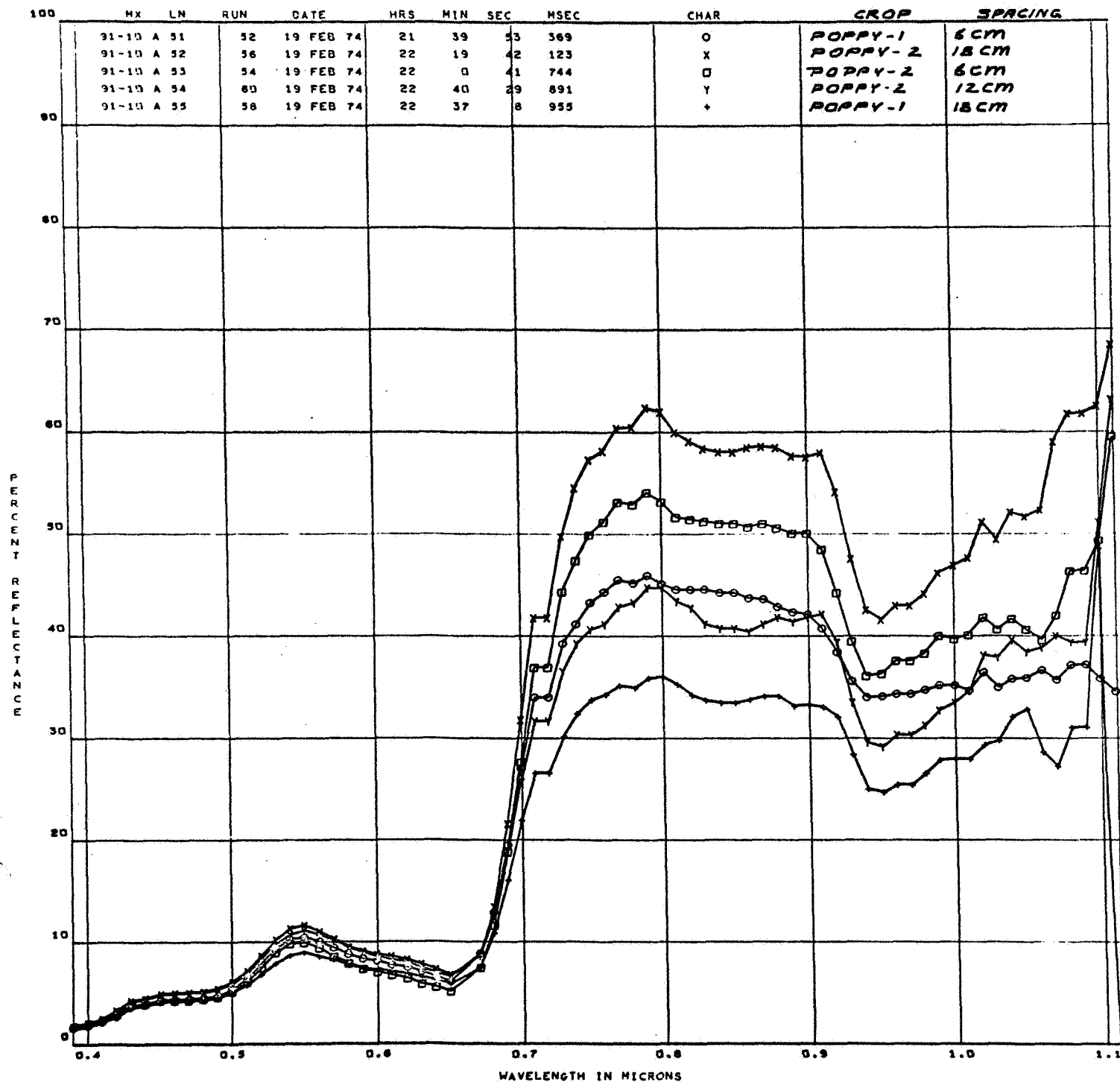
## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Jan 3, 1974	1.5	5	Moist 1.5" down	Normal	-
Jan 10, 1974	3	13	Moist .5" down	Normal	-
Jan 14, 1974	3.5	20	Wet	Normal	-
Jan 25, 1974	6	33	Moist 1" down	Normal	No weeds
					Salt on rows -
					Jan 21, 1974
Jan 30, 1974	7	35	Moist 2" down	Normal	-
Feb 7, 1974	12	50	Dry	Normal	No weeds
Feb 14, 1974	16	60	Dry	Normal	-
Feb 22, 1974	19	75	-	Normal	-

# MULTIPLE SPECTROMETER CURVES

February 19, 1974

U1108/SC4020  
0034 0000



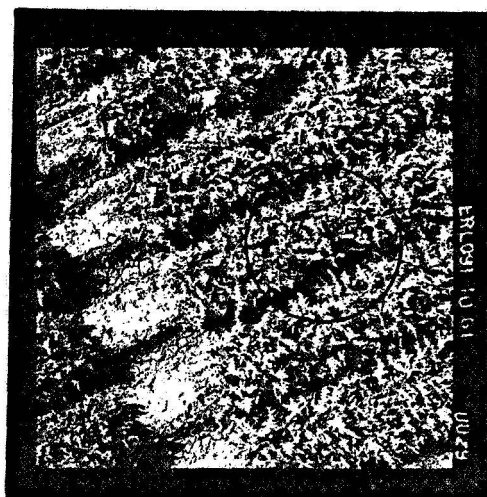
PLOT NO. 52

POPPY-2

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

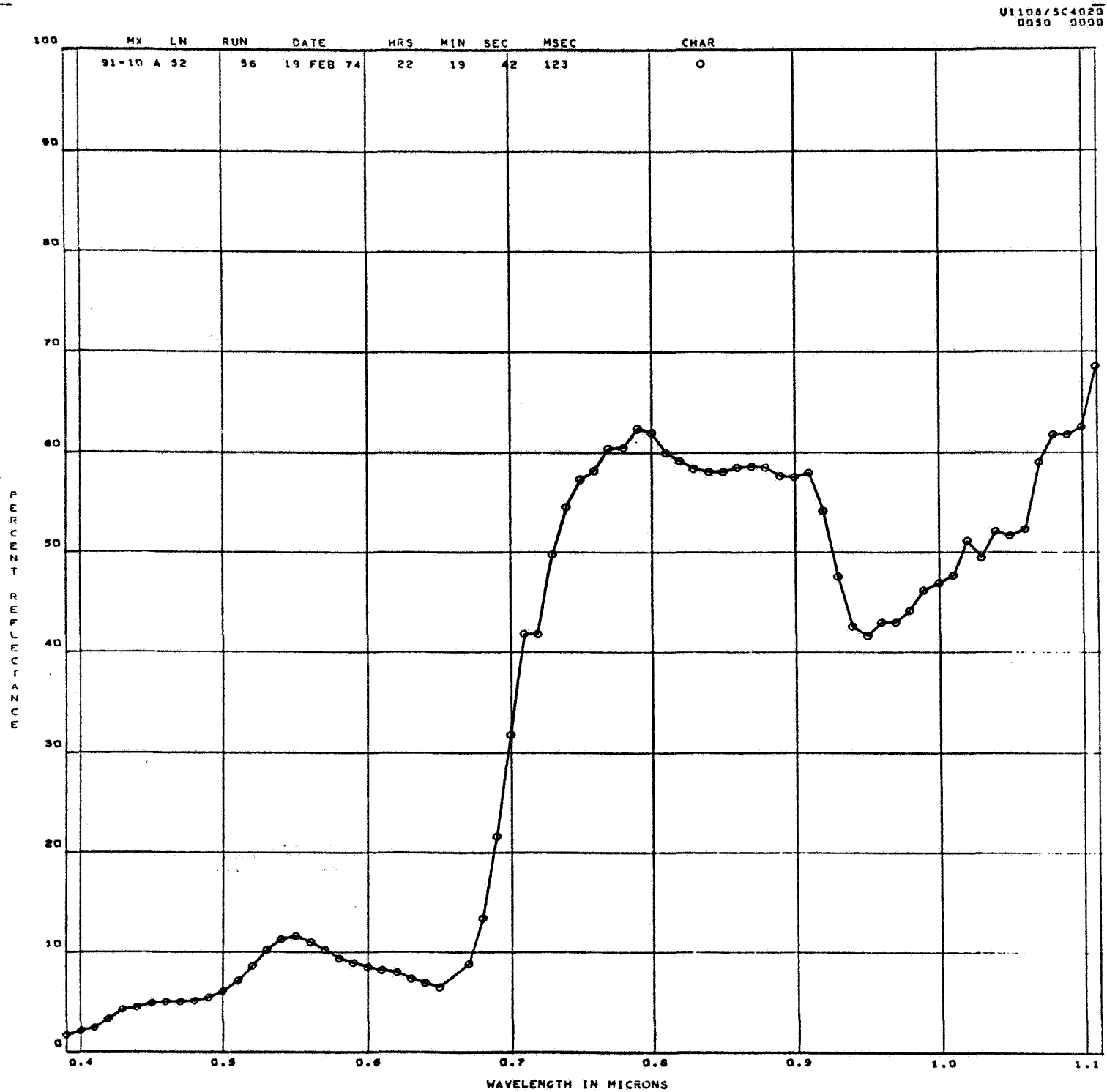
Circle represents spectrometer signature



PLOT NO. 52

POPPY-2

SPECTROMETER SIGNATURE



PLOT NO. 53

POPPY - 2  
(Acquisition No. M-89)

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac - Planted
Nov 11, 1973	Irrigated
Nov 13, 1973	First emergence
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 19, 1973	Thinned
Dec 27, 1973	Cultivated
Jan 9, 1974	Hoed weeds
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 14, 1974	Thinned double plants - Irrigated
Jan 28, 1974	Hoed weeds
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

PLOT NO. 53

POPPY-2  
(Acquisition No. M-89)  
(6 cm spacing)

GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Jan 3, 1974	1.5-2.5	10	Moist 1.5" down	Normal	-
Jan 10, 1974	3	15	Moist .5" down	Normal	-
Jan 14, 1974	4	25	Wet	Normal	-
Jan 25, 1974	8	35	Moist 1" down	Normal	No weeds Salt on rows - Jan 21, 1974
Jan 30, 1974	9	37	Moist 2" down	Normal	-
Feb 7, 1974	14	60	Dry	Normal	No weeds
Feb 14, 1974	15	60	Dry	Normal	-
Feb 22, 1974	20	85	-	Normal	-

PLOT NO. 53

POPPY-2

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

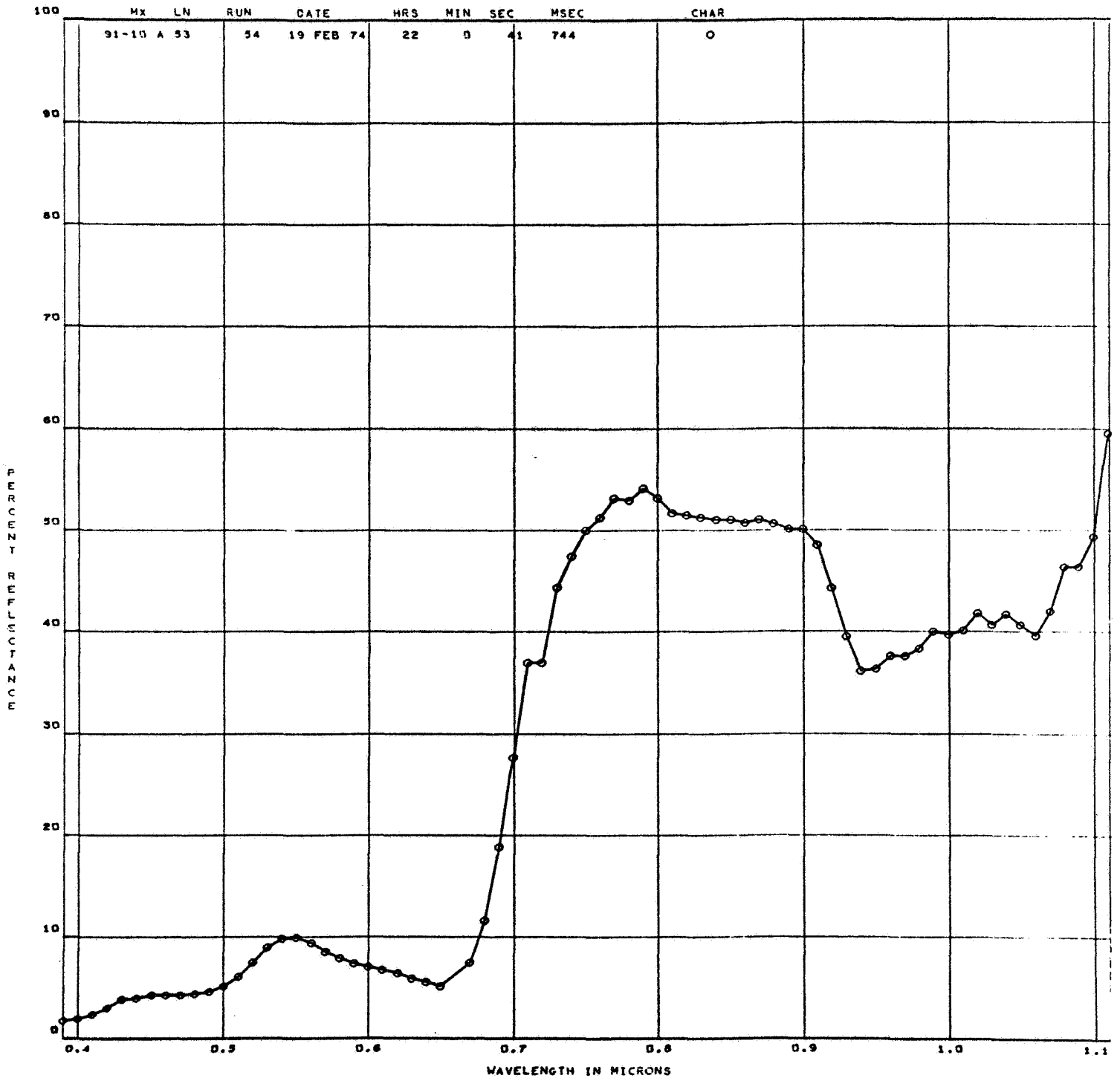
Circle represents spectrometer signature

PLOT NO. 53

POPPY-2

SPECTROMETER SIGNATURE

U1108/SC4020  
0051 0000



PLOT NO. 54

 POPPY-2  
 (Acquisition No. M-89)  
 (12 cm spacing)

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Jan 3, 1974	1	5	Moist 1.5" down	Normal	-
Jan 10, 1974	2	10	Moist .5" down	Normal	-
Jan 14, 1974	3	15	Wet	Normal	-
Jan 25, 1974	4	20	Moist 1" down	Normal	No weeds
					Salt on rows -
					Jan 21, 1974
Jan 30, 1974	6	23	Moist 2" down	Normal	-
Feb 7, 1974	10	40	Dry	Normal	No weeds
Feb 14, 1974	11	45	Dry	Normal	-
Feb 22, 1974	13	50	-	Normal	-

PLOT NO. 54

POPPY - 2  
(Acquisition No. M-89)

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac - Planted
Nov 11, 1973	Irrigated
Nov 13, 1973	First emergence
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 21, 1973	Thinned
Dec 27, 1973	Cultivated
Jan 9, 1974	Hoed weeds
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 14, 1974	Thinned double plants - Irrigated
Jan 28, 1974	Hoed weeds
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated

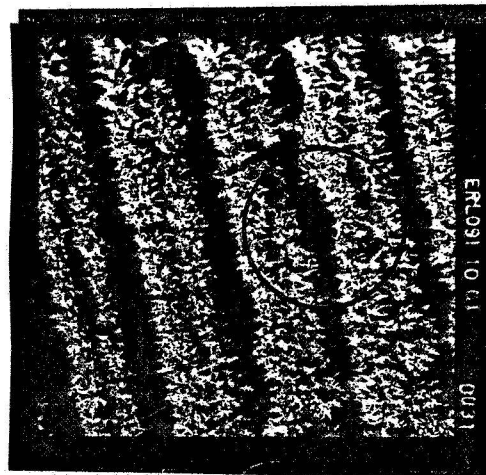
PLOT NO. 54

POPPY-2

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

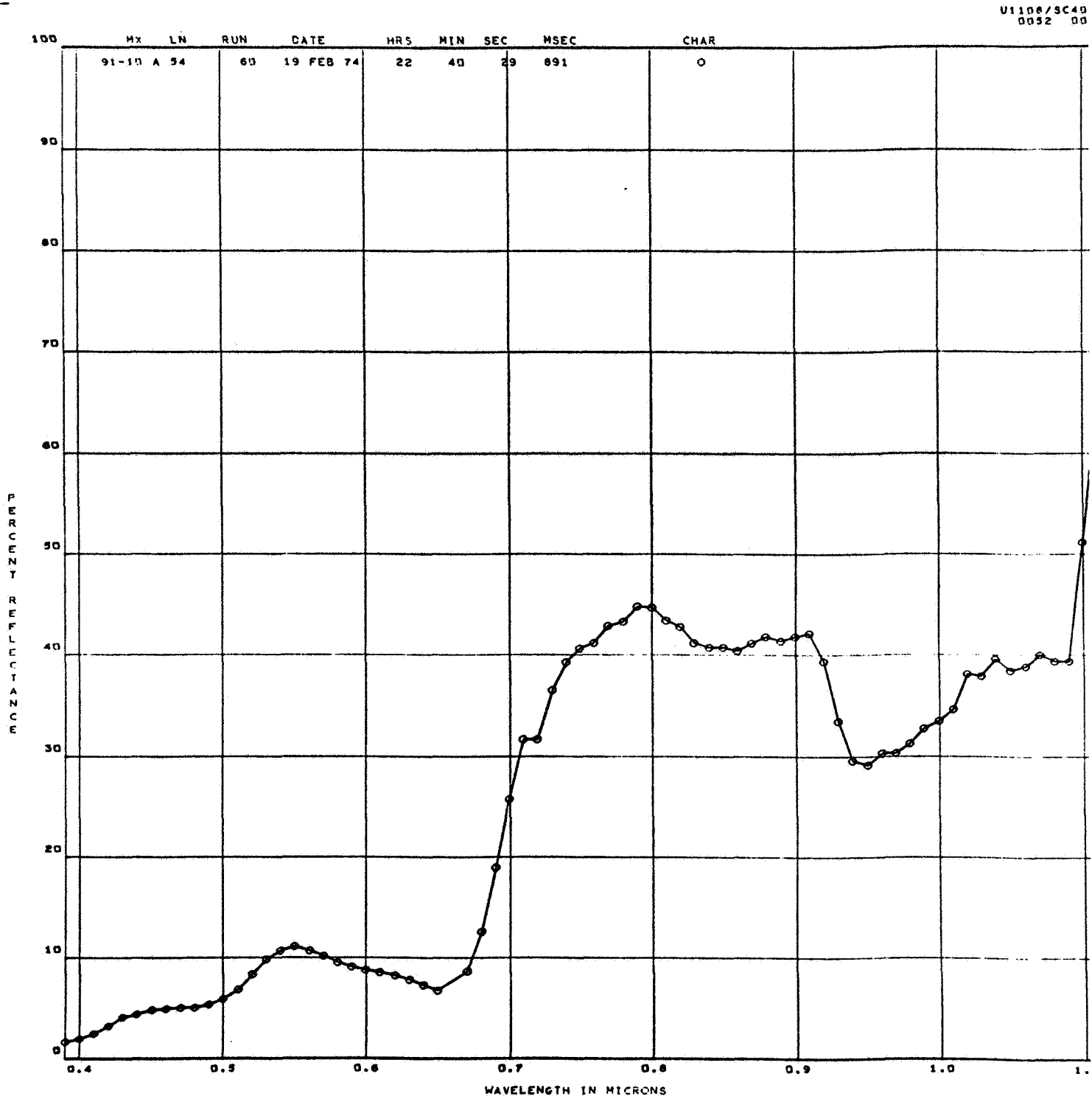
Circle represents spectrometer signature



PLOT NO. 54

POPPY-2

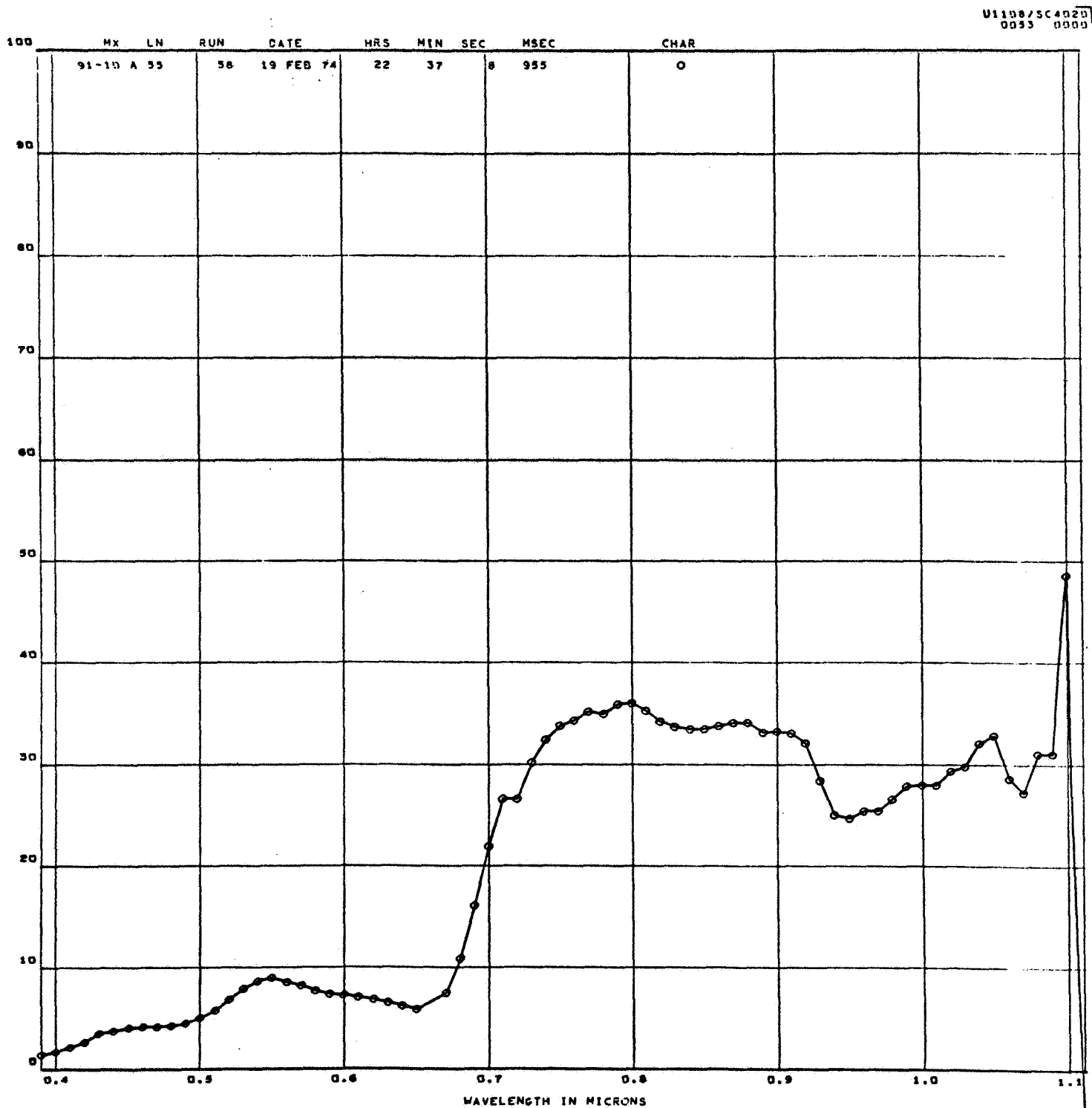
SPECTROMETER SIGNATURE



PLOT NO. 55

POPPY - 1

SPECTROMETER SIGNATURE



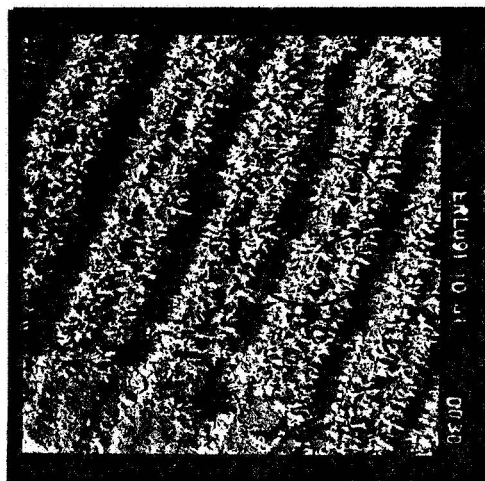
PLOT NO. 55

POPPY-1

FEBRUARY 19, 1974



GROUND LEVEL



BORESIGHT

Circle represents spectrometer signature

PLOT NO. 55

POPPY-1  
(Acquisition No. B-40-6-3)  
(18 cm spacing)

## GROUND TRUTH DATA

DATE	CROP HEIGHT (inches)	GROUND COVER %	GROUND SURFACE CONDITIONS	CROP CONDITION	COMMENTS
Jan 3, 1974	1	3	Moist 1.5" down	Normal	-
Jan 10, 1974	2	12	Moist .5" down	Normal	-
Jan 14, 1974	3	15	Wet	Normal	-
Jan 25, 1974	4	20	Moist 1" down	Normal	No weeds, salt on rows - Jan 21, 1974
Jan 30, 1974	6	20	Moist 2" down	Normal	-
Feb 7, 1974	7	30	Dry	Normal	No weeds
Feb 14, 1974	10	40	Dry	Normal	-
Feb 22, 1974	12	48	-	Normal	-

PLOT NO. 55

POPPY -- 1  
(Acquisition No. B-40--6- 3)

CROP HISTORY

Nov 6, 1973	Fertilized with 50 lbs N/Ac - Planted
Nov 11, 1973	Irrigated
Nov 13, 1973	First emergence
Nov 15, 1973	Up to a stand
Dec 7, 1973	Fertilized with 50 lbs N/Ac - Irrigated
Dec 27, 1973	Thinned - Cultivated
Jan 9, 1974	Hoed weeds
Jan 11, 1974	Sidedressed with 50 lbs N/Ac
Jan 14, 1974	Thinned double plants -- Irrigated
Jan 28, 1974	Hoed weeds
Jan 31, 1974	18 cm test plants N - S 12", E- W 14.5", height 5"
Feb 14, 1974	Furrows cultivated
Feb 15, 1974	Irrigated